Textile World

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Textile World

September, 1936

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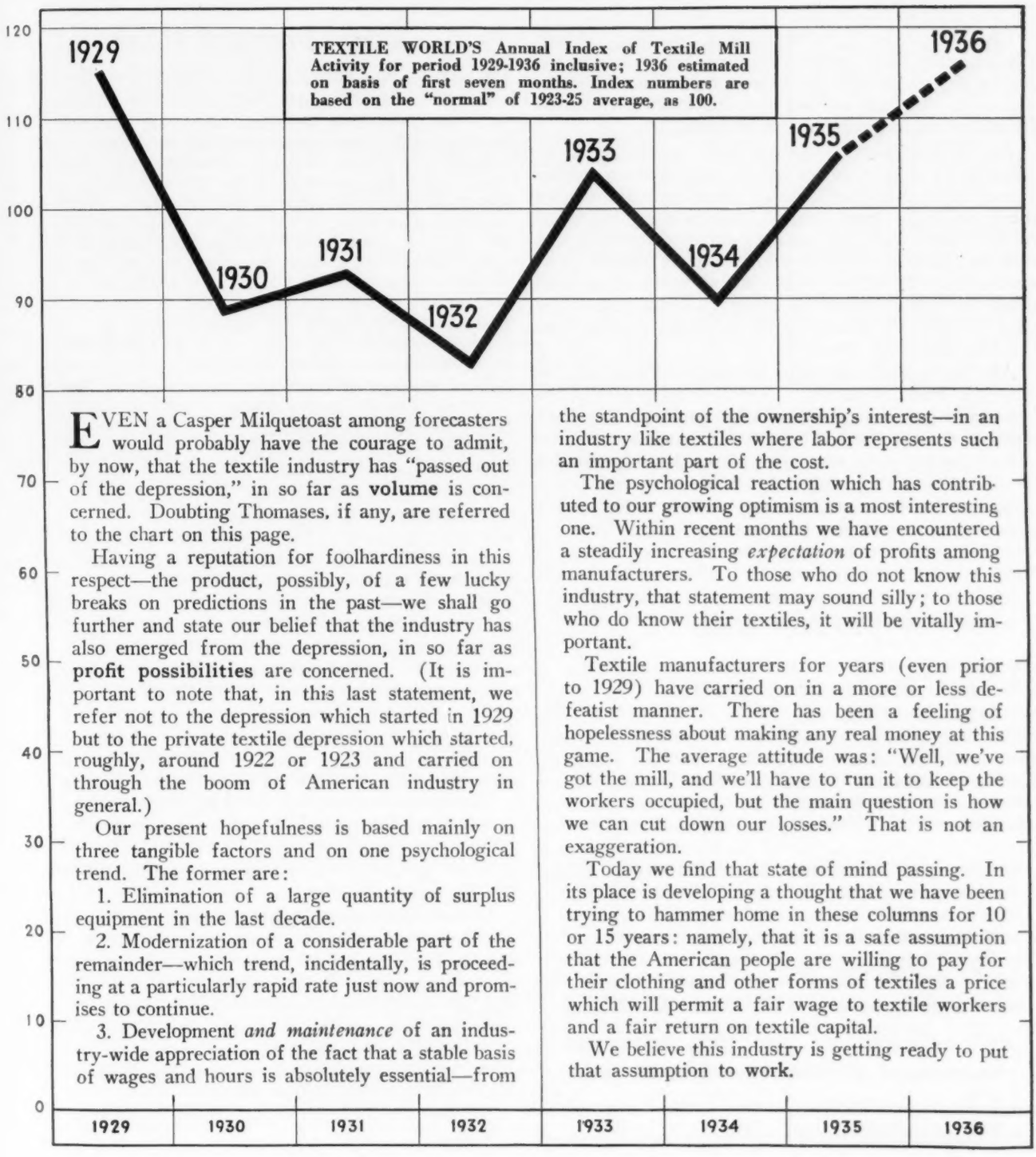
Editor: DOUGLAS G. WOOLF

Extry! Textile Barons Demand a Profit!



EVEN a Casper Milquetoast among forecasters would probably have the courage to admit, by now, that the textile industry has "passed out of the depression," in so far as **volume** is concerned. Doubting Thomases, if any, are referred to the chart on this page.

Having a reputation for foolhardiness in this respect—the product, possibly, of a few lucky breaks on predictions in the past—we shall go further and state our belief that the industry has also emerged from the depression, in so far as **profit possibilities** are concerned. (It is important to note that, in this last statement, we refer not to the depression which started in 1929 but to the private textile depression which started, roughly, around 1922 or 1923 and carried on through the boom of American industry in general.)

Our present hopefulness is based mainly on three tangible factors and on one psychological trend. The former are:

1. Elimination of a large quantity of surplus equipment in the last decade.

2. Modernization of a considerable part of the remainder—which trend, incidentally, is proceeding at a particularly rapid rate just now and promises to continue.

3. Development *and maintenance* of an industry-wide appreciation of the fact that a stable basis of wages and hours is absolutely essential—from the standpoint of the ownership's interest—in an industry like textiles where labor represents such an important part of the cost.

The psychological reaction which has contributed to our growing optimism is a most interesting one. Within recent months we have encountered a steadily increasing *expectation* of profits among manufacturers. To those who do not know this industry, that statement may sound silly; to those who do know their textiles, it will be vitally important.

Textile manufacturers for years (even prior to 1929) have carried on in a more or less defeatist manner. There has been a feeling of hopelessness about making any real money at this game. The average attitude was: "Well, we've got the mill, and we'll have to run it to keep the workers occupied, but the main question is how we can cut down our losses." That is not an exaggeration.

Today we find that state of mind passing. In its place is developing a thought that we have been trying to hammer home in these columns for 10 or 15 years: namely, that it is a safe assumption that the American people are willing to pay for their clothing and other forms of textiles a price which will permit a fair wage to textile workers and a fair return on textile capital.

We believe this industry is getting ready to put that assumption to **work.**

The Editor Says:

The Rust Cotton Picker

HISTORY in the making! That's what the first public demonstration of the Rust cotton picker late last month meant to many observers. Some, of course, could see only its faults. It gathers up foreign matter and thus lowers the grade, growled one news dispatch. It leaves too much of the cotton behind it, barked another. We imagine many who saw Eli Whitney's cotton gin at its first test passed similar judgment upon it.

Obviously, it is impossible to state now that this particular cotton picker is the last word, but at least it has shown enough promise to warrant its being taken very seriously. In fact, we feel that its possibilities should be studied more carefully than its faults!

Among these possibilities, of course, are its social implications. Deeply as we are concerned over another factor which may contribute to technological unemployment, we feel a great deal of bunk is being expressed on this point. No one—not even the inventor—can stop mechanization of cotton production if it proves to be economically favorable. This subject has been debated again and again throughout history. There were many who thought they could stop the industrial revolution of the late eighteenth century!

All that can be done is to lessen the violence of the change as much as possible. For their awareness of the importance of this phase of the problem, the Rust brothers deserve credit.

Incidentally, those who are sobbing about saving and perpetuating the "individualistic" character of cotton agriculture as it exists in many sections today have a strange idea of something worth saving!

■

The First Move

ANNOUNCEMENT of a coordination meeting of officials of the various organizations in the cotton textile industry, to take place in New York the day prior to the 10th annual meeting of the Cotton-Textile Institute, represents the first move in a direction which we have long pointed out. For years we have held that greater coordination among the textile associations was absolutely necessary. Our first suggestion was for an American Textile Institute embracing all associations in the various branches of the industry but we later came around to the compromise idea of a national council composed of representatives of these associations which would still keep their individual identities. The move announced by Dr. C. T. Murchison is of course confined to only one division, the cotton branch, but marks an unmistakable trend for the industry as a whole, in our opinion.

Once more we ask: Eventually; why not now?

■

Echoes from Last Month

THE leading editorial in last month's issue developed some interesting comment. One man writes:

"I am particularly impressed with your statement that the wage scale is our fundamental industrial relations problem, and while I do not think I would have agreed with this position five years ago, I am now quite sure that you are entirely right. I still feel that industrial employees are better off as a result of some of the things that have been provided for them by the management, but it is human nature not always to want the things that are best for us, so that I have begun to wonder if it would not be better for southern textile mills to put the cost of certain industrial relations activities into the pay envelopes and let the employees provide these things for themselves if they want to, or spend the money as they please."

That happens to be right down our alley. For years we have been advocating a change in this respect, particularly with regard to mill village costs. Actually, it would be primarily a book-keeping change but its effect would be tremendous. We hope to see this discussed frankly in the industry during the next year.

And here's a rather big order:

"Your editorial is of particular interest to me, but I wish you would follow it up with another editorial on the essential necessity of maintaining stabilized textile operations so that employee income can be surrounded with some degree of security. You can elaborate on that point in your own resourceful style, which I think might be helpful."

Of course we had in mind this question of the necessity of maintaining stabilized operations, when we said in the editorial: "What the worker is interested in is his income: its amount and its stability." Again, when we said later on: ". . . to offer some reasonable assurance that such a basis will be continued."

The question of method by which this stability can be secured and maintained is something else again. Personally, we have spent more time thinking about this one problem than probably any other, since we have been an editor. There is still a lot of thinking to be done.

One of the practical approaches—as we have pointed out in these columns before—is by way of an inventory control plan hooked up with the production schedule. The trouble here is that many textile manufacturers say "their business is different" and "it can't be done." We believe it can be. When we suggested this to the correspondent, he agreed—but offered the further thought that to inventory control must be added what might be termed style control or style interpretation.

But here we are at the end of the page—so more about this later.

Turn to page 79 . . .

and start reading TEXTILE WORLD'S story of one of the great industrial romances of all time: the first 25 years of rayon production in the United States!

Coordination Move in Cotton Industry

AN important move toward closer coordination of effort in dealing with industry-wide problems within the cotton textile industry will be taken in New York on Tuesday, Oct. 27, when presidents and secretaries of the several regional, State and group organizations meet, according to announcement by Dr. Claudius T. Murchison, president of the Cotton-Textile Institute.

The conference, Dr. Murchison points out, will bring together for the first time officially the principal executives of these organizations, and assumes added importance in view of the fact that it is scheduled for the day before the 10th annual meeting of the Institute on Oct. 28 which, it is expected, will result in development of an aggressive program for protection and advancement of the industry's interests during the coming year.

Through the conference it is hoped to achieve a complete understanding of the relationships of the various organizations to each other and thus build a plan of cooperation which will not only increase the importance of each organization in its own sphere but will also insure the most effective mobilization of the industry's full power, without conflict of purpose or duplication of effort between activities of industry-wide interest.

Among those who will participate are:

Donald Comer, president, and W. M. McLaurine, secretary-treasurer, American Cotton Manufacturers Association; Frank I. Neild, president, and Russell T. Fisher, secretary-treasurer, National Association of Cotton Manufacturers; H. W Moore, president, and Hunter Marshall, Jr, secretary-treasurer, Cotton Manufacturers Association of North Carolina; S. M. Beattie, president, and W. P. Jacobs, secretary-treasurer, Cotton Manufacturers Association of South Carolina; W. N. Banks, president, and T. M. Forbes, secretary, Cotton Manufacturers Association of Georgia; T. Scott Roberts, president, Alabama Cotton Manufacturers Association; W. H. Suttenfield, president, Fred M. Allen, secretary, and Mrs. M. G. Barnwell, executive assistant, Southern Combed Yarn Spinners Association; W. S. Montgomery, chairman, Print Cloth Group; C. Whitney Dall, president, National Rayon Weavers Association; Josef Pollack, president, and David Snyder, secretary, Cotton Thread Institute; and representatives, as yet unnamed, of Fall River Cotton Manufacturers Association, and Fine Cotton Goods Exchange, New Bedford.

Amoskeag Industries Purchases Mills

PUBLIC auction of the property of Amoskeag Mfg. Co., Manchester, N. H., was avoided when sale of its physical assets was confirmed by Referee Arthur Black Sept. 15 to a group of New Hampshire citizens headed by former Mayor Arthur Moreau of Manchester who deposited a check for $500,000 with the referee on Sept. 3 as part payment for purchase of the plant at a price of $5,000,000. There are various legal steps that may hold up consummation for more than a month.

The purpose of the newly formed group, known as the Amoskeag Industries Inc., is not only to avoid a "fire sale," which threatened, but to sell the plant in sections to those who would operate them.

The Public Service Corp. of New Hampshire has offered to buy the hydro-electric plant for $2,250,000 if the deal goes through. Of the balance needed to complete the purchase price of $5,000,000, citizens will subscribe $1,000,000 and the rest will be borrowed from banks.

Machinery Builders Have Boom Also

(From TEXTILE WORLD'S *New England office)*

SOME textile machinery manufacturers would like to run a second shift if there were an ample supply of skilled and semi-skilled labor in the community, some are running two shifts, some are running three in certain departments, and even the relatively few that are not on full time are mainly holding back to be doubly assured of a good backlog of orders for the winter. That in brief, is the story; but it is the fundamental rather than the spectacular aspects that have the greater significance.

Advances in the design and performance of textile machinery during the last 10 years or so are well known, but the actual amount of such modern machinery that has been installed is relatively small. Granting that the industry does not need as many productive units as were in place 15 years ago, there still remains a large market for replacements. More than one machine builder, when questioned on the subject, stated that, although business had been getting better steadily since the first of the year, the potential market was scarcely scratched. Keeping in mind the fact that machinery manufacturing itself has gone through a "shrinking" process of late years, the more optimistic individuals look forward to a market that can keep them busy for five or ten years.

No one, of course, is foolish enough to believe that the machinery business can run along by itself merrily if there is a decided slump in textile mill activity over any considerable period, but this is not looked for. As for the present, mills are in a buying mood, and it is a good guess that the TEXTILE WORLD'S index of machinery sales for 1936 will be up toward the level of 1929 when the series was started.

Cotton Crop Report Amazes Market

MARKET reporters exhausted their stock of adjectives in trying to describe the bullish cotton crop estimate as of Sept. 1, and its effect upon yarns and goods. "Astonishing" — "amazing"—"sensational" were some of the phrases used, and it was recorded that the trade "gasped" when the news came out. None of this was exaggeration.

The Government estimated a domestic production of 11,121,000 bales as of Sept. 1, which means a drop of 1,360,000 bales since Aug. 1 when the estimate was 12,481,000. The new estimate compares with the final crop of 12,638,000 bales in 1935, 9,636,000 in 1934, and 14,667,000 for 5-year (1928-32) average.

The immediate effect of course was to send cotton prices sharply up—more than $2.75 a bale the first day—and to stiffen prices in both yarns and fabrics, as well as to spur buyers to operate. It is generally felt that the report foreshadows a continued strong position of the goods market through the fall.

Imports of Japanese Cloths Increase

STATISTICS just released by the Textile Division of the Department of Commerce reveal the total importation from all countries of cotton cloth for consumption for the half year ending June 30, 1936 to be 63,766,000 sq.yd. valued at $5,511,000. This compares with 36,623,000 sq.yd. for the same period in 1935 and is slightly in excess of the 1935 total for twelve months, according to W. Ray Bell, president of the Association of Cotton Textile Merchants of New York.

These figures relate only to the goods generally described as "countable cotton cloths" which are covered by import classes 304, 305 and 306. Velveteens, handkerchiefs, table covers and rugs, in which there is an important Japanese traffic, are not included.

Japanese imports in these classes for the six months periods were 45,290,000 sq.yd., over 71% of the total, and for June alone, 12,038,000 sq.yd. out of 14,624,000 from all countries. This is the highest monthly importation of foreign cotton cloth since March, 1925. It is connected by the Department with importers' efforts to accumulate stocks in advance of the tariff rise which became effective on June 20.

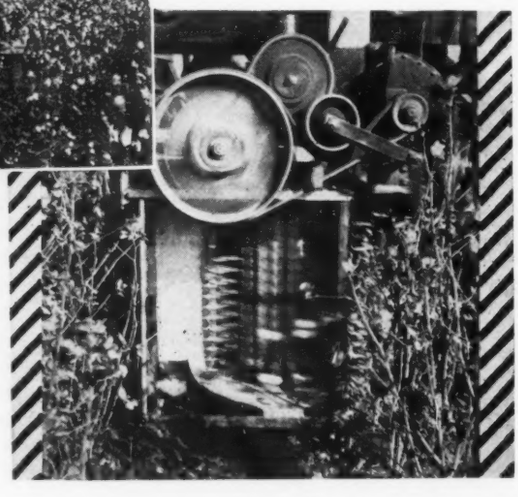
In July, first full month of new tariff, imports of cotton cloths from Japan fell to 4,705,000 sq.yd. but it is too early to conclude that this foreshadows continuance of reduced volume.

Rust Cotton Picker

Means gradual motorization, but not violent economic upheaval

By Mildred G. Barnwell

Executive Assistant, Southern Combed Yarn Spinners Association



Above: Front view of Rust cotton picker in action; cotton plants slip between armor around wheels to come in contact with spindle belt. Center: Rear view of same picker showing row cleared of mature cotton and with leaf still left on plant. Below: Closeup of belt and spindles operating on Pima cotton in Arizona.

TRUCKLOAD after truckload of laughing, shouting negroes rattle out of town, their headlights picking out the graveled roads in the murkiness of early dawn, as they head toward outlying plantations. On those places the big bell clangs, calling the hands to the field, for it is cotton picking time in the Delta and there is work for all to do.

There live few southern negroes who will not be in the cotton fields at some time during the picking season. The most immaculate cook, the best trained butler, the most reliable chauffeur are apt to leave their town jobs to pick cotton, for the urge that draws them to the fields is stronger than they. Cotton picking time is vacation time for them, but it is big money too!

From sun-up to sun-down field hands plod down the long rows, dragging nine-foot long sacks behind them, sacks which will be filled and emptied many times before the truck carrying the "weighing scales" comes in late afternoon when each picker's cotton is weighed in, the hands paid off and trucked back to town.

All this is part of the tradition and economic background of the South. Will the laughter and shouting of the field hands give way to the staccato bark of the tractor and smell of gasoline as cotton goes to market?

"Maybe—but not yet," says John Rust, inventor of the Rust Brothers cotton picker, who with his brother Mack supervises the building of these machines which threaten to revolutionize and modernize methods of cotton production.

These blonde Texas giants picked cotton as boys on the 160 acres homesteaded by their father. It was not fun to them, it was drudgery. They grew up with that as their background. John went to work in Kansas wheat fields, then later with a farm implement company; Mack went to University of Texas, graduating in Mechanical Engineering. These two minds of mechanical bent completed their first cotton picker in 1928. Since then they have devoted their entire time to its perfection; now they turn their efforts toward production and marketing.

They claim that the Rust cotton picker is a practical and field-worthy machine. It has been tried out successfully in cotton 36 to 72 in. high at the Delta Experiment Station, Stoneville, Miss., and after working in fields of rank stub pima cotton near Phoenix, Ariz., the only damage to the machine was a few broken but easily replaced spindles. Mechanically it is head and shoulders above any other cotton picker ever constructed. The theory of the whirling spindle to gather cotton from the open boll is not a new one. Since the labor shortage immediately after the Civil War earnest inventors have fussed with this same plan, but the Rust Brothers are the only ones who have made it workable. They moistened their spindles!

The Rust machine consists primarily of an endless

ENOUGH experimental work has now been done with the Rust cotton picker to permit a preliminary and tentative estimate of its significance. This the author of the accompanying article has done, after a special field-trip. Final evaluation, as she points out, must be withheld pending operation for several seasons under actual farm conditions.

One of the most interesting aspects of this development is the attitude of the inventors toward its social implications. They are trying to provide in advance against serious effects of labor-displacement resulting from use of the picker. This is a laudable ambition. We feel, however, that the author of this article said the final word in this comment: "The cotton farmer cannot afford to shy off motorization of labor-saving machines because of social problems involved. No other industry has sacrificed modern and efficient equipment for hand labor."

That is the realist speaking—and, like it or not, this is a realistic world.—Editor.

belt carrying 1,300 smooth steel wire spindles, each about 6 in. long, the belt being 16 spindles wide. The revolving belt, bristling in the manner of a porcupine, passes along the row of cotton, the rotating spindles entering the plants. The speed of travel of the spindle carrier, and the consequent movement of the spindles in the backward direction during contact with the plant, is approximately equal to the speed of the forward travel of the machine. The spindles, therefore, while in the plants rotate in a position approximately stationary with relation to the stalks. This avoids damaging the plants. Prior to their entrance into the plants the spindles are automatically moistened as they pass through a rubber and sponge contraption kept constantly wet from a ten-gallon water tank above. The moisture on the spindle causes the open cotton to adhere to the rotating spindles and to be pulled from the bolls, remaining on the spindle until the belt revolves past a suction fan which frees the cotton from the spindle and delivers it to a container. The machine picks only the open cotton, leaving uninjured the stalks or green bolls. True, cotton opens unevenly, but this machine may be carried over rows as often as desired, picking the cotton as it opens with no injury to the rest of the plant. This is an important feature, for cotton must be picked as it opens; otherwise much would be lost in grade.

The market possibilities of the cotton picker are bound by geographical restrictions and its potential purchasers fall into three classes. The mechanical picker can be operated wherever a tractor is satisfactorily used but probably will not be so successful in hilly sections of the cotton belt as on flat stretches. It will be more practical in actual operation in the flat lands of the Delta than anywhere in the cotton belt, although its potential market stretches eastward from Dallas, Tex., to the Atlantic Seaboard.

Rear view of Rust cotton picker at work on a Louisiana plantation; note how clean row has been picked.

Farming in some sections has become as much of a mechanized undertaking as any other industry. In the cotton belt the classic "nigger and mule" has already given way to a considerable extent to tractors with disks and middle-buster, planter and cultivator attachments. The efficient plantation manager contracts by the year with professional entomologists and airplane companies to keep his insect infestation down; he rotates his crops to get the best out of his land; he plants improved strains of seed; he uses a minimum amount of tenant labor and brings in truckloads of day labor from the nearby towns when chopping or picking time comes around. Naturally he is on the alert for further methods of improving efficiency in operation and looks upon the Rust cotton picker as the missing link in the mechanical production of cotton.

Planters of that description will become the first users of the picker. Clover Hills, near Clarksdale, Miss., a plantation almost completely cultivated by motorization, will use four Rust pickers this fall. On such a plantation mechanical picking is the next logical forward step.

The second volume market for the cotton picker consists of every farmer who owns a two-cylinder tractor. Every Farmall operator is a potential customer for a cotton picker. In this class there will develop strong competition. Machine-harvested cotton, when it runs into volume baleage, will set the price. Other planters in order to meet competitive basis will be forced to adopt machine systems also. From this situation there will probably evolve a community plan of leasing the cotton picker so that the small-tract or one- to five-bale farmer may share a picker's benefits with his neighbor.

The third market for the cotton picker will be the cooperative farms scattered here and there over the country. These farms are worked by groups of former tenants who have underwritten the farm, assumed the mortgages, and are working their crops and buying the land as a cooperative unit. One of the Rust pickers will be leased to such a farm in Mississippi this fall. Twenty-five families will have the use of one machine to harvest cotton from approximately 400 acres.

Included in the above class is Soviet Russia. Through the Amtorg Corporation two outright sales have been made to the Russian Government and the machines, attended by mechanics from the Rust Brothers shops, have already been shipped to the U. S. S. R. where they will be in operation this fall.

With the exception of the sales to the Soviet the Rust Brothers do not anticipate selling their cotton pickers. At present the plan is for the pickers to be placed through a leasing scheme. The leased machines will be let to responsible parties—planters who will not dehabilitate tenants because of the labor-saving machine—at a rate of $1,000 the first year, $400 the second, $300 the third and $100 each succeeding year, lessee to replace broken parts and take care of the general upkeep of the machine. Rust does not want to sell, Rust wants to keep a check-rein on labor displacement.

Be that as it may, the market is opening up. During the last few years farmers have been unable to buy anything. During the 5-cent cotton years they fed their

families and their negroes on rabbit sausage; during the government loan years they placed their bonus checks from the A.A.A. against mortgages, smaller scattered financial obligations, lapsed insurance policies. Now, for the first time since the Farm Board pegged the price of cotton at 16c a pound the farmer is able to consider the repairing of his farm houses; the replacement of implements; the purchase or lease of new type motorized farm machinery.

Can't Dodge Motorization

The cotton farmer cannot afford to shy off motorization or labor-saving machines because of social problems involved. No other industry has sacrificed modern and efficient equipment for hand labor. Since, as yet, the Rust cotton picker is not a mass production item but is being placed in use slowly and carefully, the labor change will be gradual and there will be no violent and sudden upheaval as has been threatened by many view-with-alarmists. This is proved by simple mathematics. In order to completely motorize the cotton belt a greatly magnified volume output would have to flow steadily from the Rust cotton-picker factory. The price would have to be within reach of the average farmer. Such a volume cannot be produced overnight. Mack Rust estimates that 10,000 pickers will be in the field in ten years time. That is his maximum guess, his fond hope. That does not limit the output to American fields. Any machinery improvement made in the United States will also find consumers elsewhere. For instance, if there had been an available supply of the Rust cotton pickers, they could have been placed in 15 foreign countries now growing cotton or experimenting with cotton production.

Under the curtailed acreage program and the government loan plan of the A.A.A. the United States lost a part of its foreign cotton market which has been taken over by other countries. Due to the inroads of synthetic fibers cotton has lost part of its domestic market. There is only one way to regain our foreign and our domestic markets: by low-priced cotton. Machine labor may be the answer to our farm problem.

"If production costs can be reduced 20%," says W. E. Ayres, manager of the Delta Experimental Station at Stoneville, Miss., "our markets can be regained." This statement brings us to the question of comparative costs of hand picking and mechanical picking of cotton.

It is estimated by a practical businessman, who is also a planter, that the minimum cost of operating the Rust cotton picker, counting depreciation, obsolescence, interest on investment on picker as well as tractor to operate picker, together with fuel, labor and repair cost, would be $2.50 per hour or the theoretical cost of picking a bale of cotton with the mechanical picker would be $5.00 per bale as against the approximate $10.00 per bale, hand-picked at this season's wages. Theoretically, then, we have a saving of one cent per pound or $5.00 per bale on the picking cost.

The person most interested in cotton, beside the farmer who grows it, is the textile executive who manufactures it. The mill man is interested in only one phase of the Rust cotton picker—"What will machine-picked cotton be like, how will it work in my mill, how will its quality be affected"? he asks.

Mr. Ayres thinks the advantage of getting the cotton out early will offset whatever roughness may develop from the mechanical operation of the picker. Actually, it is claimed, the fiber is not injured. While machine-picked cotton may carry a slight percentage more of leaf than hand-picked cotton, (*Continued on page 138*)

Style Trends

By Emma Lou Fetta

In silks and velvets for winter 1936 and spring 1937

LAST March I recommended in these columns a close watch on a new "elegance" trend in fall fabrics: elegance based on intrinsic worth, on conservative rich patterns, and on a thorough-going quality of appearance. These predictions have been justified and may be repeated as guidance for the months leading into the spring.

Velvets: Crush-resistant velvet is considered the big advance spring fabric signpost by various important manufacturers. It is believed that before long women will demand crush resistants for both durability and style.

Last March, we predicted applied decoration on rich plain fabrics. Beadings, for example, are now coming strongly forward on sheers, on lamé blouses, etc. Velvet thus handled is a coming step.

Shirts, blouses and skirts—definitely new velvet fields—are predicted. Washability will be an important factor for blouses—and the washable velvet must be the kind that can be put directly in the tub and laundered.

Printed velvets, usually high fashion, are nevertheless not favored by American makers, opinion being that velvet construction in itself is sufficiently rich, and that prints are a needless "guilding of the lily." Metal-threaded velvets may, however, leap ahead of all-metallic constructions in the fabric field. Frosted versions indicate a very strong future with their cut pile of hard-twisted acetate and their silk back. Tailored velvets will appear in herringbone and twill versions. For late spring will come silk organdy grounds and unusual velvet motifs.

In colors, the Coronation velvets will wield a strong influence. One of the outstanding velvet houses believes there is little or no style significance in "off-shades," muted tones, or subtle colors. The trend, its stylist is convinced, definitely points to "right out in the open colors," influenced by the cotton shades of this season. Red with them will be the red of red gingham; there will be a true navy velvet of the tone associated with cotton percales, and a brown typically found in brown dotted Swiss. Ochre, or true copper, will be softened down for textile interpretation. Green will tend toward the dark, "jungly" type. Its running mate will be white—dead white. In fact it is possible to foresee white accompanied by color as strong for spring as black accompanied with color will be this fall.

Silks: There is strong basis for predicting a continuation of clochy fabrics for sports, daytime and evening. Satins themselves will be touched by the clochy influence, showing bark-like effects, blisters and wrinkles pressed down, lacquered and cire surfaces.

Outdoor silks will incline toward a "wooly" appearance in many instances but will not be bulky. It will be an effect, not a hand. Both the rustic and the exotic are in the silk picture. Satins, in other words, will be vieing with irregular yarn constructions—cylindered surfaces, moire and clochy patterns, tiny matelasses, and some large disk effects.

That lustrous materials are due for continued strong promotion in a wide variety of interpretations seems to be a wise summation for the evening picture.

The Plant Engineer . . .

His place in the organization of a mill employing 150 to 200 workers

By Glenn H. Alberga
E. E.

IN the March, 1936, issue, Joseph E. Martel presented his views as to the most suitable organizations for staple- and fancy-goods woolen mills of 50 to 100 looms. Mr. Alberga believes that the group to which Mr. Martel limited his article is in reality not so restricted, but is analogous to any mill employing from 150 to 200 hands and is, therefore, a very sizeable and important proportion of all industry.

THE manufacturing establishments in the group with which Mr. Martel dealt may be called the problem class, because they are at the point of their existence (if not stagnant) of either growing up into what is usually termed big business, where the functions of each executive and department are clearly defined and highly specialized, or of sliding back into the smaller, so-called one-man type of plant. This problem group faces a dilemma. As a mill grows, it is confronted on the one hand with the desire to add competent men to perform specialized duties, and on the other with the difficulty of justifying these items of expense.

While Mr. Martel indicates that he is conscious of the technical phase of the problem, it is in this phase that the writer takes most serious issue with him, especially in the point of view that power and maintenance are not distinctly functions of the engineering department. TEXTILE WORLD has frequently commented editorially on the necessity for keeping pace with modern machinery and methods. We are living in a technical age. This brings up the need for a new appraisal of the modern plant engineer, who has evolved gradually from the old master mechanic. His position on the organization chart is only slightly below that of the plant manager.

Unless the ownership is vested in a man of money who is inexperienced in mill management and has other interests, most authorities agree that the president and plant manager should be one and the same man in mills of the size under discussion. The plant manager invariably has a practical mill man as superintendent. Duties of the chief executive or plant manager are listed in Table I. There are other details that gravitate to the executive; he is the court of last resort in all things.

Although an engineer is a good type for the position, it is obvious that engineers do not, and cannot, head all concerns. The engineering detail is too much to be carried out by one man, in addition to the executive duties. What, then, are the duties of the plant engineer? Let us assume that a mill employs 150 workers and has hired an engineer for the first time. Gradually his activities are likely to embrace all the items listed in Table II.

In each of the fields given, the engineer should be able to contribute. He may find certain items on the list fully developed and beyond improvement (this is rare). He is certain to find many things totally neglected and he must devise and carry out some program. Each of the topics is worthy of an article by itself. They may be modified or variously stressed, depending on the other executives. However, regardless of the abilities of the other key men, a competent engineer can, at some time, do a lot of constructive work along all of the lines listed.

A number of the activities might be turned over to some other employee after they are started. For instance, if the mill has a nurse, as is required by law in Massachusetts, she would handle the physical-examination and medical-attention program after it is initiated. In other cases the engineer would merely see that a business-like periodic report is submitted to the manager by the proper agency, as for example, in the analysis of supply costs. These instances, however, are in contrast to the fields of yarn testing or analysis of loom-part breakage, which are wholly within the engineer's field.

Because the management engineer penetrates every phase of the mill's operations, and because he is usually an "added attraction" in the small company on its way up the ladder, he is invariably unpopular at first. As he barges in with his penchant for change, at some time or another most of his fellow executives will be gunning for him. To survive, he must have an unusual gift of diplomacy, in addition to thorough knowledge.

Table I

EXECUTIVE
To take care of the financial requirements.
To take care of the legal matters.
To formulate the policies.
To indicate the rate and path of expansion or diversion.
To supervise and coordinate the activities of the office manager, sales manager or selling agent, engineer, superintendent, and any other key men.
To study reports, recommendations, and analyses of the accounting and engineering executives, and to determine the action to be taken, if any.
To act as good-will ambassador to the trade, the employees, the community, the industry, and the vendors.

OPERATING ROUTINE
To accept or refuse orders.
To handle some sales activities, often mostly correspondence.
To purchase yarns, dyestuffs and heavy chemicals, and machinery.
To determine operating schedules.
To govern precedence of processing and shipments.
To maintain and endeavor to raise the standards of quality and service.
To make all disbursements and sign checks.
To pass credits.

Table II

PLANT
Maintenance.
Design and supervision of new plant.
Construction.
Modernization.
Protection (fire, water, theft.)
Insurance relations.
Alterations.

MACHINERY
Maintenance.
Selection of new machines.
Installation.
Modernization.
Elimination of hazards and insurance of continuity of operation.
Insurance relations.
Machine study.

EMPLOYEES
Maintenance of competent employees.
Selection of new employees.
Training and acclimatization.
Physical examinations and medical attention.
First aid and safety committees, etc.
Insurance relations.
Rate and task setting.

ENGINEERING
Drawing and making of blueprints.
Statistical records.
Analysis of supply costs.
Analysis of expense.
Analysis of raw material costs.
Analysis of labor costs.
Analysis and distribution of power, light, steam, and gas costs.
Testing and laboratory work.
Research.
Design.

INSTALLATION AND MAINTENANCE OF SYSTEMS AND METHODS
Inventory control.
Planning control.
Production control.
Budgetary control.
Cost-accounting system.
Office systems.
Mill systems.
Production methods.

MILL OPERATION
Purchasing and specifications (except as handled by manager).
Mechanical Department:
Machine work.
Carpenter work.
Blacksmith.
Steamfitting and plumbing.
Painting.
Electrical work.
Electricity-generation and/or distribution.
Steam and/or distribution.
Watchman and grounds.

Life-Saver . . .

That's what modernization was to Rocky Mount Mills, its management believes

"WHAT saved our corporate life during the last several years was the fact that we have taken a liberal depreciation *and have spent it*. Too often, the depreciation item is just a book-keeping entry. With us, it has meant actual replacement of machines throughout the plant, and scrapping the old equipment."

That statement of policy made to us by Hyman L. Battle, treasurer and manager of the Rocky Mount (N.C.) Mills, is borne out by the facts:

1. During the last three years the company has spent approximately $400,000 (40% of the amount of its capital investment) on new equipment.

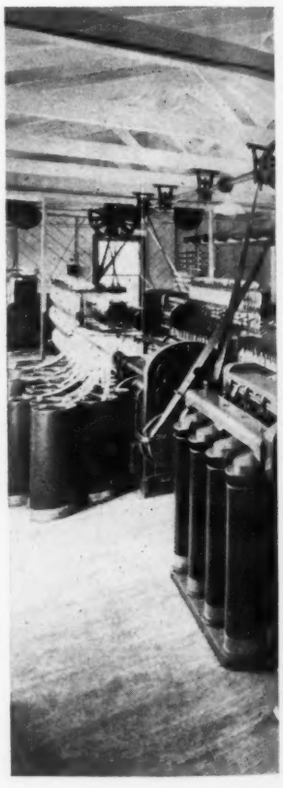
2. In the last four years, it hasn't lost a day (except the usual holidays and enforced curtailment under the NRA) or sold a pound of yarn below cost.

We won't go too deeply into the matter of cause and effect; possibly there's a little of the old "hen and egg" controversy in it. All we know, however, is that during the last four years a carded yarn mill could not possibly have made a net profit each of the last four years (which Rocky Mount did) unless its equipment *was* kept in top condition.

First, as to the details: The major items of equipment on which the $400,000 was spent included the latest type of card stripping on all of the cards, four slubbers, 18 speeders, 60 new long-draft spinning frames, long-draft equipment on 86 existing spinning frames, traveling cleaners on spinning and spooling, 48 new large-package twisters, six high-speed winders, three high-speed warpers with cone creels, plus of course a vast amount of complementary machinery. Today the entire mill is on long-draft.

Rocky Mount's executive offices are in a stately old mansion approached between rows of box

IN presenting a modernization story in these columns recently we described it as a "natural." We think the story of modernization at the Rocky Mount Mills can be described in the same way. We recognized it as such when Hyman L. Battle made the remark with which we start this article. We believe so thoroughly in modernization of plant and method as a life-saver, that we thrill every time we hear a manufacturer say this piece for us.—Editor.



Old Equipment Junked

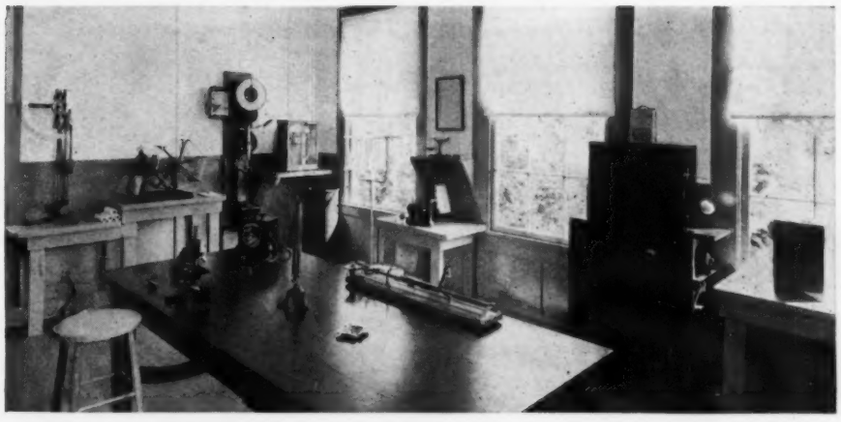
One of the most interesting phases of this program is the consistent policy of scrapping every piece of equipment that is replaced. Even some that had been put in as late as 1927 has been junked within the last couple of years. Here is what the management thinks about that, according to Mr. Battle:

"It is our belief that if all the mills, when modernizing their plant, would adopt this policy and refuse to sell the equipment that they take out, regardless of price, it would have a very stimulating effect in the industry. It certainly seems to us to be a mistake to sell to one's competitor equipment that is comparatively new at a low price and thereby enable him to get a certain advantage that otherwise he would be unable to obtain for himself."

Experimental Unit Completed

Linked up with this policy of maintaining plant efficiency at top rating is the recent completion of an experimental mill which is a complete unit containing a card, a drawing frame, a long-draft slubber, a short-draft slubber, a long-draft speeder, a short-draft speeder, a spinning frame, a spooler, a twister and a winder. Together with a very complete laboratory this

is housed in a separate building and is in charge of a former instructor at North Carolina State College. Experimental and development research is carried on there, and in addition the company is also enabled to offer its customers analyses of their products. Entire freedom is left to the director and his assistant, and their efforts are not diluted by responsibility for control analysis; the testing rooms in the mill take care of that.

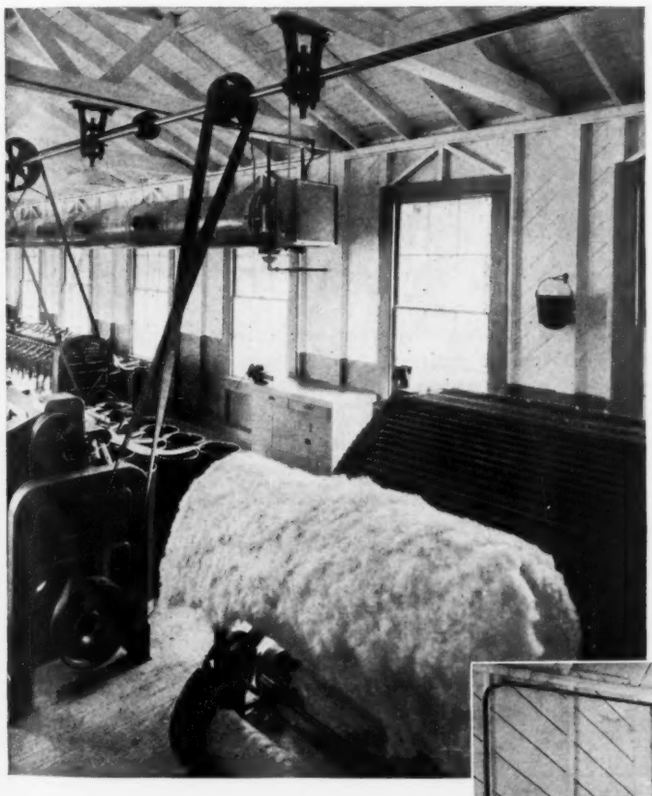


View in Rocky Mount's laboratory showing its modern testing equipment

Labor Relations

In tracing the story of a company which believes in, and practices, modernization, the question of its labor relations always arises. It is therefore interesting to note that Rocky Mount has been firm in its adherence to code wages since the very beginning of NRA and that it took the interesting step of guaranteeing against wage cuts as recently as last June. Its sales notes carry a clause to the effect that yarn covered by the contract has been or will be manufactured in conformity with the former textile code—that is, minimum wage of 30c per hr. with usual differential for skilled labor, two 40-hr. shifts on productive machinery, and no child labor.

This policy, in fact, has characterized the company since long before NRA. "The thing we are proudest of in this management," stated Mr. Battle, "is that we can operate and run a mill decently, pay full-scale wages—or above, and still make a profit." In any event, it is interesting to note that the company's labor turnover runs less than 5% a year; also that it has 13 employees who have been connected with the concern for more than 40 years and 192 employees who have been on the payroll over 10 years.

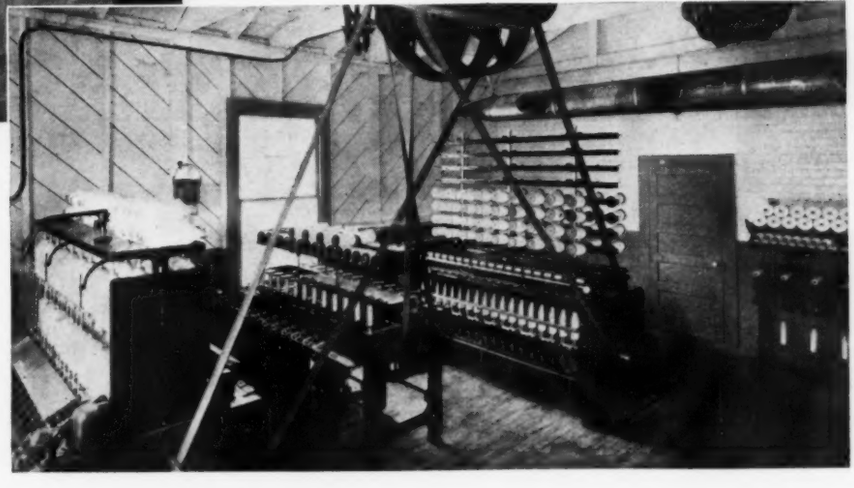


Selling Products Intelligently

In addition to keeping its plant up to date, one other factor is of major importance in its progress, according to Mr. Battle—and that is an attempt to sell its product intelligently. Continued diversification of product has been one of the important steps toward that end. The company's merchandising policy is summed up by Mr. Battle in the remark that "some of our customers feel that the Rocky Mount Mills is their spinning organization."

* * *

By the way, this company we are writing about was established in 1818, and authentic records indicate that it is the oldest textile mill in North Carolina!



The experimental mill at Rocky Mount—View down the complete layout starting with card on right

Spinning machinery (photo at right) in Rocky Mount's experimental mill. All photos by James Huntington, Greenville.

Machinery organization, with long-draft modifications, for

By Gilbert R. Merrill
Lowell Textile Institute

40s TO 60s COTTON YARN

THIS IS the fifth article of a series on the calculation of cotton-yarn organizations—a series which fills one of the great gaps in textile literature. If you have followed the articles thus far and would like an opportunity to test your knowledge, prepare for nexth month's article by calculating an organization for 80s combed yarn, double roving in spinning, 6.6% spinning contraction, four roving operations, two drawing operations, 18% noil, 6% card waste—and in October compare your results with Professor Merrill's.

THE following organization for 40s to 60s, balanced at 50s, is suitable for quality yarns such as are used for threads, voiles, organdies, lawns, muslins, shirtings, and handkerchiefs.

The cottons commonly used for yarns of this kind are American peeler and Egyptian, ranging from 1 3/16 to 1⅜ in. in staple and from strict middling to good middling in grade.

Four roving operations must be used with regular draft, and double roving is common in spinning. The roving drafts are all rather low because this is the coarser end of the range of yarns requiring four processes of roving.

To obtain high quality, combing is essential. Two possibilities are offered in combing, one suited to the newer types of combs using the heavier laps (700-grain) and one suited to the Heilmann type of comb using light laps (525-grain).

Double roving in spinning. Four roving operations.
Spinning contraction 5%. Two drawing processes.

Spinning contraction 5%	.95) 50.	
Spinning draft	10.52) 52.63	
	5.00	
Spinning doublings	x 2	
Jack draft	5.7) 10.00-hank jack roving.	
	1.75	
Jack doublings	x 2	
Fine draft	5.6) 3.50-hank fine roving.	
	.625	
Fine doublings	x 2	
Intermediate draft	5.0) 1.25-hank intermediate roving.	
	.25	
Intermediate doublings	x 2	
Slubber draft	3.6) .50-hank slubber roving.	
	.1388-hank or 60-grain finisher-drawing sliver.	
Finisher draft	6	
Finisher doublings	6) 360	
	60-grain breaker-drawing sliver.	
Breaker draft	6	
Breaker doublings	) 360	
	60-grain comb sliver.	
Comb draft	60	
Comb noil 14½%	.8575)3600	
Heads in comb	6)4200.....	8) 4200
	700	525-grain ribbon lap.
Ribbon draft	3.43	4
Heads on ribbon	4)2400	4) 2100
	600	525-grain sliver lap.
Sliver draft	2.08	2
Sliver doublings	24)1248	20) 1050
	52	52.5-grain card sliver.

Card draft	×96.....	×95
Card waste 7%	.93)5000	
	437.5)5380	
	12.25-oz. finisher lap.	
	13.00-oz. breaker lap.	

Buckley opener
Bale-breaking feeders

Long-Draft Modification

A mill making yarns similar to the 50s just considered, but 48s count, used the following organization after installing long draft in spinning. Notice that the spinning draft is not high for cotton of this staple. One roving operation was eliminated, which made it necessary to increase the roving drafts over those used in the original organization.

Long Draft in Spinning

Double roving in spinning. Three roving operations.
Spinning contraction 5%. Long-draft spinning.

Spinning contraction 5%	.95) 48.00
Spinning draft	17.57) 50.52
	2.875
Spinning doublings	2
Fine draft	6.6) 5.75-hank fine roving.
	.87
Fine doublings	2
Intermediate drafts	5.6) 1.74-hank intermediate roving.
	.31
Intermediate doublings	2
Slubber draft	4.5) .62-hank slubber roving.
	.138-hank or 60-grain finisher-drawing sliver. Etc.

When this same mill tried out an installation of long-draft roving, it reduced the roving operations to one. Note that this long-draft roving frame uses a much higher draft than the spinning frame. While this particular installation produced yarns as strong as the yarns from the long-draft spinning organization, it must be recognized that these installations are still relatively new and there is no standard procedure.

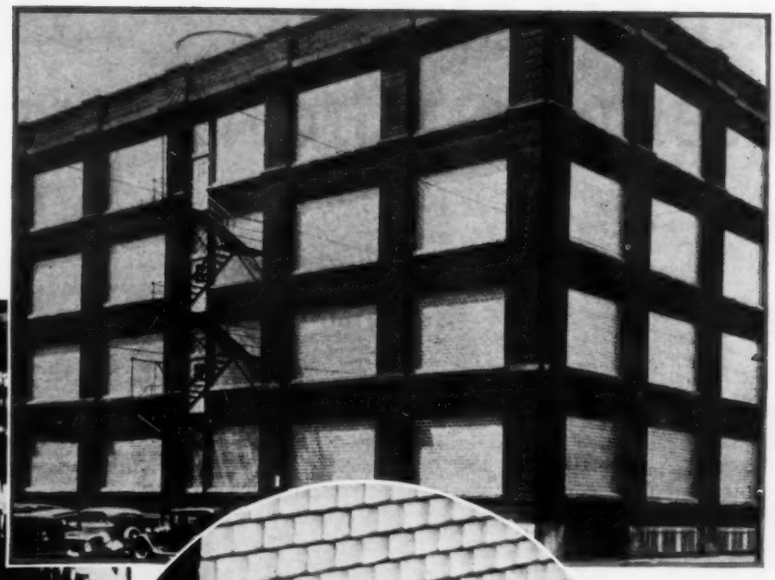
Long draft in Roving and Spinning

Double roving in spinning. One roving operation.
Spinning contraction 5%. Long-draft roving and spinning.

Spinning contraction 5%.	.95) 48.00
Spinning draft	17.57) 50.52
	2.875
Spinning doublings	2
Roving draft	41.37) 5.75-hank roving.
	.139-hank or 60-grain finisher-drawing sliver. Etc.

It is interesting to note that this second organization for 48s makes it possible to produce this yarn with just one of each operation, if a mill is willing to consider one drawing process. While this does not seem so unusual in such counts as 13s, for which an organization has already been given, it certainly seems very extreme for combed 48s.

Right: View of Heineman plant after window areas were filled with glass brick.
In circle: Light is well-diffused over the skein winders.
Below: Louis Druckman, chief engineer, finds light adequate at the twisters.



THE WINDOWS ARE BRICK

But the bricks are glass in Oscar Heineman's Mill No. 2

GLASS bricks instead of windows. In that way Oscar Heineman, president of Oscar Heineman Corp., Chicago, solved some of the problems caused by condensation in Mill No. 2, where silk is thrown for hosiery manufacturers.

Freedom from icicles was the primary goal sought. The Heineman Mill No. 2 is four stories high and located on a busy thoroughfare. Therefore, when the moisture-laden air of the production rooms (which are kept at 70% relative humidity or more) seeped through the windows in winter and froze into huge clusters of icicles, not only was light restricted but passers-by were put in real danger. Mr. Heineman and his engineers tried numerous schemes to overcome this difficulty but were not successful. Finally Mr. Heineman conceived the idea of tearing out the windows and filling the openings with glass brick.

His own engineers were dubious about the plan. Local builders discouraged the idea, as something that had never been done and so was sure not to work. Nevertheless, Mr. Heineman decided to make a test, ordered one 8x14-ft. window torn out, and had glass bricks put in. This was early in 1936, when the weather still was cold enough to permit studying the effect of freezing on the glass brick.

When continuous observation and tests demonstrated that the glass-brick installation really had solved the icicle problem, plans were made to have the whole plant converted into a "windowless" structure with glass-brick panels. Bricklayers did the job, in spite of the protests of the Glazier's Union, which felt the work to be more in its field. It took the bricklayers some time to get used to handling the new material, but the installation was successfully completed early in the summer.

Although the joints between the glass bricks are tight and not easily susceptible to leakage, a waterproofing was used in the cement and, as a further precaution, each seam was sealed with a special rubber-containing compound. Louis Druckman, chief engineer of the Heineman plant, is therefore confident that the condensation problem is solved.

Mr. Druckman also points out the following additional benefits that have been realized from the installation: The high degree of light diffusion afforded by the glass brick illuminates the entire 100x125-ft. floor, and bright sunshine never necessitates the drawing of shades. Therefore, the installation has materially reduced artificial-lighting costs. Working under daylight, the operatives do better work and show less fatigue. Finally, there is no longer the cost of window-painting and of replacing broken windows, once a considerable item in the Heineman neighborhood.

HORIZONTAL NEEDLE-ALIGNMENT

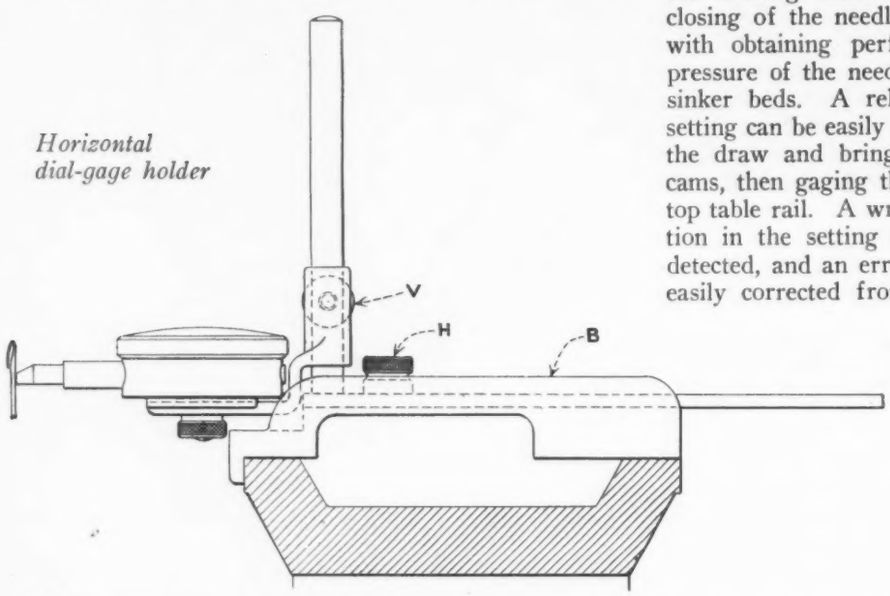
How it may best be accomplished in full-fashioned hosiery machines

By Walter A. Simond

IN the first article of this series on the accurate alignment of full-fashioned knitting machines, published in the August TEXTILE WORLD, consideration was given to the heights of the needles and knocking-over beds. In this second article the horizontal alignment of the needles will be considered. Without doubt, these three adjustments and alignments are basic and the most important. They must be absolutely right in order to obtain stockings of uniform length and quality.

Since the stitches must fall upon knocking-over bits

Horizontal dial-gage holder



which have working edges consisting of two arches converging in a V-notch, it is of vital importance that the stitches fall at the same point on all of the knocking-over bits. Frequently it has been found that fracture of the fabric is caused by stitches which fall too high upon the front arch of the bits, this trouble being caused by the needles being too far back at that time. The stitches, as a result are subjected to an almost direct downward pull.

The in-and-out movement of the needles is controlled mainly by the presser cams, but the setting of the needle bars for both the pressing and knitting-stitch alignment should always be made with the stitch cams in control of the needles. The setting is obtained by the use of a fixed gage which gives the correct horizontal distance from the front table rail. In making the initial setting, or a realignment, it is always necessary to have the stitch-regulating mechanism in correct position when the fixed-distance gages are used. With the dial gage the needle bars can be accurately aligned to the setting of the first head, and in subsequent realignments it is necessary only to set to any desired position of the needle bars.

The degree of accuracy required in the horizontal gaging of the needle bars is not realized by those unfamiliar with this type of knitting machine. To illustrate, an error of only .0005 in. in the setting of a needle bar would be multiplied to .75, or $\frac{3}{4}$ in., in a stocking having 1500 courses in the total length of the leg, assuming that the other cooperating parts were in correct alignment. If only one side of the single-head needle bar were that much in error, we might find one side of the leg to be three-quarters of an inch longer than the other at the back seam or selvage edges.

Presser-Cam Rollers

At present we set our presser-cam rollers to accurately ground block gages inserted between these rollers and the low dwell of the presser cams while the needles are held in the yarn-drawing position by the stitch-regulating shaft and cams. This is an important setting, since it affects the accurate division of the stitches by the dividing sinkers and the timing of the landing and closing of the needle beards, which has so much to do with obtaining perfect selvages and the amount of pressure of the needles against the presser edge of the sinker beds. A reliable test of the presser-cam-roller setting can be easily made with the dial gage by finishing the draw and bringing the presser rollers against the cams, then gaging the distance of the needles from the top table rail. A wrongly timed presser cam or a variation in the setting of a presser roller will be quickly detected, and an error in the setting of the rolls can be easily corrected from this position of the machine by the gage reading.

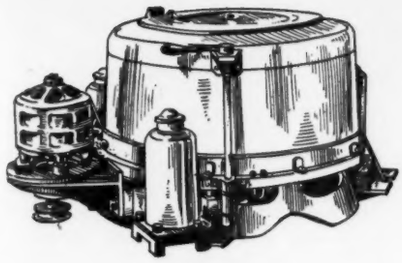
It has been found that the dial gage may be used for the accurate setting of slur cocks and verge plates by the method described in the article on "Falling-Bar Adjustment," which was published in the TEXTILE WORLD of March, 1933; and moreover, since a slur cock having a worn working surface always requires a deeper setting than normal and a consequent forward setting of the verge plate, such slur cocks may be easily detected with the gage in the event of catch-bar trouble.

Catch-Bar Alignment

The absolute alignment of the catch bar may be obtained by measuring at each arm with the dial gage; and where the sections of the catch bar are joined, both sides of the joints should be gaged to determine if the bar sections are in alignment at these joints. This test should always be made with the catch bar back, for, if it is forward, its alignment may be distorted by the faulty position of one or more verge plates.

In the accompanying diagrammatic sketch, *V* is the locking screw by which the foot (to which the dial gage is secured) is first clamped at any desired height. *H* is the knurled screw head where the horizontal slide is secured to the base *B*.

In his next article, to appear in an early issue, Mr. Simond will discuss stitch cams and stitch units.



TIMED HYDRO-EXTRACTION

Prevents variations in finish of silk hosiery

By Samuel G. Newman

THE dyer in a certain hosiery mill received a complaint from the superintendent to the effect that of two batches of stockings of the same style and construction, one batch had a much softer handle than desired and a poorer appearance than the other. A check-up showed that precisely the same type and amounts of ingredients were used in both batches to obtain the finish sought. Furthermore, the type and amounts of degumming compounds used and the time of the dye-bath run were, for all practical purposes, identical. Feeling that perhaps the human element was responsible for the variation, the dyer gave closer attention to the weighing of the various chemicals and to the subsequent treatment of the goods.

The Same Complaint

A few days later, the same complaint reached the dyehouse. The next step was to check up on the extraction of the goods. Service-weight goods were, of course, given a longer extraction than chiffons. The operative ordinarily determined the necessary amount of extraction by the appearance of the stream of liquor at the outlet of the centrifugal. When he believed that the stream had reached its exhaustion point, and that about the same amount of extraction had been given the lot in question as compared with similar lots, the centrifugal was turned off and the goods were unloaded.

It was suggested that perhaps all the extractions were not as uniform as they might be. The operative then was instructed to pay more attention to the time of extracting, and a definite amount of time was stipulated for each construction of hosiery. Variations in the finishes of the goods were lessened considerably as a result of this procedure.

One can prove to one's self that hosiery extractions have an important bearing on the uniform feel and appearance of finished fabrics by carrying out the following experiment: Take two dyed batches of the same weight and constructions and give them identical finishing treatments. Extract one batch the usual way. Give the other batch a much longer or a much shorter extraction. Ask the boarders how the two batches board. Also, ask the examiners to compare the feel and appearance of the two lots. Somewhat different handles and different boarding effects are the usual results. A longer extraction will leave much less finish in the goods than a shorter extraction, which accounts for the lack of uniformity.

Hydro-extracting of hosiery means more than simply removing most of the excess water. A certain definite amount of moisture must be retained by the stockings, depending on the type and weight of the goods. This is important if the goods are to receive an even drying and proper boarding. Ask any boarder what he thinks of working stockings, especially the sheer numbers that are produced today, that have not been extracted sufficiently. The answer is certain to be anything but pleasant. The excess moisture makes the goods too hot to work and causes the hands of the boarder to be burned and blistered.

Assuming that the boarders are using the common metal type of form, hollow within and supplied with steam for the heating, excess moisture in all types of hosiery retards production because of the longer drying time required. On the other hand, if goods are hydro-extracted too much, some parts of the stocking will dry out before other parts come in contact with the drying form. The result is an unevenly dried and badly boarded fabric of poor appearance. The most affected part is usually the welt or hem, which has a tendency to curl up at the edges.

When stockings of the very sheer type are to be extracted, it is good practice first to cover them with cheese cloth or put them in net bags to eliminate pulled threads. This precaution will reduce the number of seconds.

Time-Control Device

The correct time of extraction to be allotted each style number can be arrived at by cooperation between the boarding and dyeing departments in the carrying out of experiments on extracted lots, carefully observing the results, and making the necessary allowances and corrections for each case. Once the proper time of extraction for each number is determined, it should remain constant if the best results are to be secured. Modern extractors are equipped with automatic time-control devices, and aid greatly in obtaining uniform extracting.

Weather conditions have a pronounced effect on the reaction of stockings to boarding. For that reason, extracted stockings must not be allowed to remain too long on the floor before boarding. Goods, especially in the summer time, should be covered with a damp cloth or placed in a conditioning truck to prevent loss of moisture. Rewetting of the goods when too much moisture has evaporated will cause more of the finish to wash out. The result is that the stocking falls short of the finish desired after boarding. It is important therefore, that stockings be boarded from the original liquor and rewetting of the goods be avoided as much as possible.

Obsolete extractors are a liability and should be replaced with up-to-date equipment having an automatic timer and a safety cover connected in such a manner that the basket cannot be started when the cover is open or the cover opened when the basket is in motion.

Extractors should be lubricated systematically, regularly, and thoroughly if they are to give the best performance. The basket of the centrifugal should be frequently cleaned and scoured, so that no finish residue or clingers remain on the sides to cause stains on subsequent lots of lighter shades or white hosiery.

COTTON TWILLS

By John Hoye

IN THIS, the ninth, instalment of his series on STAPLE COTTON FABRICS, Mr. Hoye discusses twills in general and drills in particular. Next month he will detail jeans, three-leaf warp twills, coutils, and three-leaf filling twills.

THE second foundation weave is the twill weave. For the benefit of the layman who may have occasion to refer to this discussion, and with the indulgence of the more experienced, it should be explained that in this weave each warp yarn does not interlace with each filling yarn, as in the plain weave; instead, it interlaces with only the second, third, fourth, etc., filling yarn, floating over or under the remainder. Assuming, by way of illustration, that the cloth is being held vertically, then adjacent warp yarns interlace with progressively higher or lower filling yarns, thus forming diagonal lines of floats.

Because of these fewer interlacings, twill weaves permit the weaving of more threads to the square inch than does the plain weave. For this reason, many twill cloths are closer woven and consequently stronger than plain-woven cloths. However, if a plain-woven cloth and a twill-woven cloth are each made with exactly the same number of threads to the square inch, and with the same yarns, the plain-woven cloth will be the stronger, because it will have more interlacings or binding points than the twill-woven cloth.

In regular twills, each succeeding float begins one pick higher or lower than the adjacent float, the floats thus forming diagonal lines running at an angle of approximately 45°. The twill line can be made to run upward from right to left—called a left-hand twill; or upward from left to right—called a right-hand twill. Cotton warp-twill cloths are usually made with a left-hand twill. Cotton filling-twill cloths are usually made with a right-hand twill. Twills can be made warp face, filling face, or even sided, depending on whether the longer floats on the face of the cloth are of warp or filling or whether the warp floats are approximately the same length as the filling floats.

There are also many other kinds of twills, such as broken, steep, reclining, herringbone, reversible, double, etc. Twilled cloths start with three harnesses and in cotton twills go up to fifteen harnesses. English-made twilled cloths, if formed by the warp, are usually called *drills;* if formed by the filling, they are usually called *twills.* In the American market, the names of warp and filling twills vary. The following influences, as outlined by Nisbet, affect the prominence of the twill:

A. Character of the weave—The twill effect will be the more pronounced the longer the floats from which it is developed, but an increase in the length of float must be balanced by a proportionate increase in the number of threads per inch. Four-harness twills have bolder twill lines than three-harness twills, but they also are of higher constructions, especially in the yarn which forms the float or face. For example, compare the common 88x48 construction in four-harness cloth with the 68x40 construction in three-harness cloth.

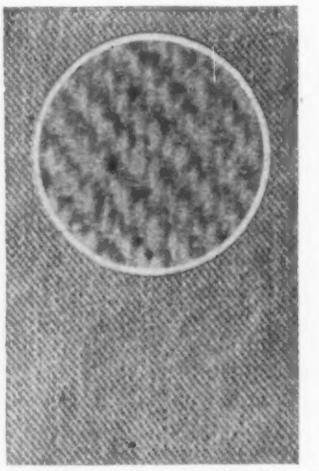
B. Type of yarn used—Hard-spun yarns will give a more distinct twill effect than soft-spun yarns. Combed yarns will also give a better twill than carded yarns, and ply yarns will give a bolder twill than single yarns.

C. Number of warp and filling threads per inch—Higher-count twills will have a more pronounced twill effect than lower-count twills (of the same weave).

D. Direction of the twill line in relation to whether the yarn is S-twist or Z-twist—When the yarns have Z-twist, warp-face twills are made left-hand, with the twill upward to the left; and filling-face twills are made right-hand, with the twill upward to the right. These arrangements give the most prominent twill effect, illogical as it seems; and if twills are not made in this way, a modified or less-distinct twill effect is the result. However, if the twill is formed by a large number of harnesses and the direction of the twill line reversed, the twill effect would still be more or less distinct because of the long floats employed. If S-twist is used (as in the case of ply yarns, and most frequently in gabardines) direction of the twill line is to the right for warp-face twills and to the left for filling-face twills.

Most twilled cloths are uneven-sided; that is, they have more warp than filling on the face or more filling than warp on the face. Even-sided twills, which have about the same amount of warp and filling on each side, are reversible. Most of the cotton twills are regular 45°-angle twills. The simplest is the three-harness twill, which is made warp face (each warp thread floating over two filling threads) or filling face (each filling thread floating over two warp threads). There are four types of three-harness cotton cloths, two warp face and one filling face:

Warp face—drills, jeans, three-leaf warp twills (few constructions of the latter).



Minot Hooper Co.

DRILL
30" 72x60 2.50 yd.

Filling face—three-leaf (i.e., three-harness) filling twills.

Drill

Drills are three-harness warp-face (regular) twills. They are strong cloths, medium and heavy-weight. The yarns are similar to those used in coarse narrow sheetings—12s and up to 22s. In weaving, one warp thread floats over two filling threads and under one filling thread to each repeat of the weave. The weave is referred to as a 2/1 twill, or "two up one down"—the term indicating the manner in which the harnesses are lifted and lowered. The twill line runs upward to the left. These cloths are always made with carded yarns and are usually sold by width and weight. The construction is sometimes stated.

Uses in gray: Box-spring coverings, mattress tickings, pocketings, work pants, overalls, bags, drop cloths, oilcloths, auto tops, imitation leathers, rubberized fabrics, backings for emery cloth, tire linings, shoe linings, tents, strainers, filters.

Finishes used: Dyed and plain finished in various shades of khaki, olive green, navy, light shades of tan and green, etc. Brown and white starched. Printed trouserings, silesia, painted awning stripes, backfilled pocketings, starched waistbands.

Uses in finished state: Overalls, work pants, smocks, uniforms, shoe linings, hammocks, tents, sails, bookbindings, pocketings, waistbands, printed mattress tickings, summer caps, trouserings, slacks, awnings, beach umbrellas, pads, corsets, canopies, sport-shoe uppers.

Widths: The majority of drills made are in 30 and 37-in. widths. Also made 24 in. up to 29 in., and 32, 34, 34½, 36, 38, 39, 40, 41, 46, 49, 52, 54, 56, 57, 58, 59, 61, 65, 67, 69, 70, and 72 in.

Construction: Uusually 60 x 36 to 76 x 64, but also up to 86 x 42.

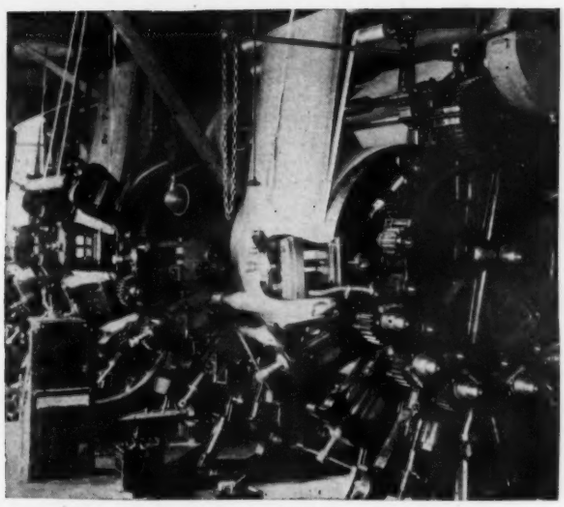
Weights: 30", 2.50 to 5.25; 37", 2.00 to 3.95.

Warp yarns: 12s to 20s.

Filling yarns: 10s to 22s.

Examples of Drill Constructions:

30"	68 x 40	5.75	37"	68 x 40	2.75
30"	70 x 40	4.00	37"	68 x 40	2.65
30"	68 x 40	4.00	37"	68 x 40	2.50
30"	68 x 40	3.50	37"	76 x 42	2.35
30"	68 x 40	3.25	37"	68 x 40	2.35
30"	70 x 40	3.25	37"	68 x 40	2.00
30"	68 x 44	3.00	39"	68 x 40	2.66
30"	68 x 40	3.00	39"	68 x 40	2.25
30"	70 x 44	3.00	40"	68 x 40	2.50
30"	70 x 44	2.85	40"	68 x 40	2.47
30"	72 x 48	2.85	41"	68 x 40	2.72
30"	68 x 44	2.85	43"	80 x 48	1.93
30"	66 x 48	2.50	46"	68 x 40	2.68
30"	72 x 48	2.50	49"	60 x 40	2.53
30"	72 x 52	2.50	52"	68 x 40	2.50
30"	72 x 60	2.50	52"	68 x 40	2.20
30"	76 x 58	2.50	52"	60 x 40	2.50
30"	71 x 60	2.50	52"	62 x 40	2.00
30"	76 x 64	2.35	52"	62 x 40	1.90
30"	71 x 60	2.35	54"	64 x 38	1.93
31"	80 x 48	2.66	54"	68 x 40	2.00
32"	68 x 40	4.75	56"	62 x 40	1.93
34"	60 x 36	4.75	56"	68 x 40	2.85
36"	66 x 40	4.06	56"	68 x 40	1.93
36"	68 x 56	2.28	57"	62 x 40	2.17
37"	66 x 40	3.95	59"	62 x 40	2.25
37"	68 x 40	3.95	59"	68 x 40	1.85
37"	66 x 40	3.50	59"	62 x 40	2.25
37"	68 x 40	3.50	61"	64 x 38	1.79
37"	66 x 40	3.25	65"	60 x 40	1.95
37"	68 x 40	3.25	67"	68 x 40	1.87
37"	66 x 40	3.00	69"	60 x 40	1.84
37"	68 x 40	3.00	70"	68 x 40	1.77
			72"	68 x 40	1.72



Steps taken to overcome some troublesome problems in

DISCHARGE PRINTING

By Francis A. Newton

IN printing discharge styles on cotton and rayon fabrics, one often runs into some minor but vexing difficulties. Below the writer is relating three experiences of that nature and is describing the steps taken in each case to overcome the trouble. No very brilliant reasoning was involved in solving these problems, but mostly a mixture of common sense and a good working knowledge of the dyes and chemicals used.

Recently, we were producing a pattern which consisted of white spots on diazotized grounds. It was found that some of the spots printed much larger than others. The white discharge consisted of 2 lb. hydrosulphite-formaldehyde, 5 pints starch-tragacanth, 8 oz. zinc oxide, and 4 oz. sodium hydrosulphite to 1 gal.

Difficulty With Roller

When the spots which were printing full were examined, it was seen that they were carrying a great deal more color than the others. This naturally caused the excess to flood the engraving and give rise to the flushed appearance. The engraving at the parts of the roller involved seemed to be much deeper, and it was afterwards discovered that the engravers had had some difficulty with the roller, necessitating hand engraving of some of the spots.

It is well known that hand engraving will usually carry more color than that produced by other methods, and this was the chief cause of the trouble. The nature of the thickening also contributed to the damage, as it was compounded to give a well-penetrated print and, therefore, was more likely to flush. The fault was overcome simply by rubbing down the hand-engraved spots until they carried approximately the same amount of color as the others.

At another time we were attempting to produce a bright blue vat discharge on a brown diazo ground. The blue used was one of the brightest blues in the vat range; but on the first attempt the discharge came up greenish and dull. It was thought that the colors had been over-oxidized and that the blue had turned green as a result. Alterations were made accordingly, but without any corresponding improvement. It was then suggested that perhaps the penetration of the color was not sufficient to overcome the dulling effect of the brown ground, which was of a yellowish cast. This was found to be the case, and steps were taken to correct the fault as follows:

The thickening was altered to a much softer mixing by the judicious addition of tragacanth, while another addition was made in the form of a small amount of sodium hydrosulphite, so that the discharge action would commence immediately after the fabric left the printing machine. In this way, better penetration and a more effective discharge were obtained, the net result being the overcoming of the dulling effect of the ground and the production of a much brighter blue discharge effect.

Some months ago we were running a style which included a basic navy blue discharge on a direct-dyed brown ground. In this particular instance, the navy was made from a mixture of two of the newer series of dyes which withstand reduction. However, the ground colors used precluded the idea of as vigorous an oxidation as was necessary for the development of the navy. The nature of the prints was such that a very soft handle was required, and, for this reason, perborate of soda was used as an oxidizing agent. If the perborate bath was too strong or too hot, the other print colors of the basic type suffered and the navy was developed at their expense, to say nothing of the dyed ground.

Compromise Effected

A compromise was effected, as follows: The navy was only partly reduced; i.e., instead of using the full amount of reducing agent formerly employed, the quantity was halved. The result of this was to make the navy brighter than before. The amount of reducing agent was sufficient to give a discharge action strong enough to overcome the adulterating effect of the dyed ground. At the same time, it was not sufficient to reduce the navy so far as to render its reoxidation a matter of difficulty. The result was to give a navy print free from adulteration and easily oxidized and therefore brighter.

Later we found it possible to oxidize in a bichrome-acetic bath with the addition of a small amount of sulphonated fatty alcohol. This avoids the dangers which accompany the use of a hot, strong perborate solution, and the addition of sulphonated fatty alcohol prevents the undesirable harsh feel which bichrome and acetic alone imparted to this particular type of print.

TEXTILE WORLD ANALYST

Market writer can leave "buts" at home as both volume and margins gain

Textile mill activity during the first seven months of 1936 was at a rate higher than that for the corresponding period of any year since 1929, according to TEXTILE WORLD's index, based on consumption of raw material. It was 15% above the first seven months of 1935, and 12½% over our assumed "normal," or the eight-year average (1924-1931) for the corresponding period. The gain is due to cotton and rayon, the use of each having increased nearly 25% over last year, while both wool and silk declined. July of this year made July, 1935 look like a piker (which it was)—topping it by 40%. . . . In addition to increased volume, there has also been a steady improvement in the opportunity for a profit, in most branches of the industry.

THE current situation in textiles is one of the most encouraging that has existed in years. It is far more healthy than the boom in the hectic NRA-AAA summer of 1933, and seems to be based on a more permanent foundation than was the improvement which started in August last year. It is characterized by an undertone of confidence which means a lot.

Furthermore this writer does not have to drag out his "ifs," "ands" and "buts" this time. Too often it is necessary to say something like this: "Production runs along at a high rate but manufacturing margins are dwindling." At present, in most branches of the textile industry, there is progress in both volume and profit possibilities.

Brief summaries for the individual divisions follow:

Cotton: Profit margins on carded cotton fabrics continued to advance in August and the average for the month was the highest since September, 1934. Carded cotton yarn margins also increased sharply. (See Tables I and II). . . . An unfilled backlog of orders, Government purchases, and late reports on drought deterioration of southwestern cotton all contributed to the strengthening of the market which has been fundamentally sound all summer. . . . The sensationally bullish crop report, Sept. 8, added the final touch.

Wool: Spring prices on wool goods disappointed the more bullishly inclined when they were announced late in August as unchanged from the earlier private quotations. Blame competition and the Robinson-Patman law permitting only one price to only one class of trade. . . . Raw wool holds its well-publicized stability with the new Australian season opening 5 to 10% up over June. . . . Fabric men, with an eye on staple fiber, believe low prices on wool goods represent best means of holding their place in the field.

Rayon: Price adjustment incident to Robinson-Patman law seems to be ending up by putting prices up where they were originally, with the exception that in most cases small and big buyers share the discount. Meanwhile business is excellent in all divisions, with August consumption a record breaker. A healthy feature has been the advance in knitted fabric prices.

Silk: Silk branch is steady and active interest is reported for fall, especially in velvets—regular and anti-crush—and satins and novelties.

Knit Goods: Increased confidence in hosiery evident at end of August among both wholesale and retail buyers. Prices on quality lines hold firm, with prices of some low-end lines tending upward. . . . Underwear mills are holding to advances announced last month and market tone is good. . . . Swimsuit season closed in exceptionally strong position and there is talk of advancing the 1937 showings. Winter lines of outerwear are opening well.

Slight change in the price structure took place between July and August and the only real shift in TEXTILE WORLD's price index numbers was the drop in raw cotton from 48 to 45. It will be noted that an index for rayon yarn is now included in the series.

TABLE I. CARDED FABRIC MARGIN

Date	Margin in cents	Date	Margin in cents
August, 1933..	21.4	August, 1935...	17.1
October, 1933.	19.1	September, 1935	17.9
January, 1934	18.4	October, 1935..	17.7
April, 1934...	17.6	November, 1935.	16.4
July, 1934....	15.5	December, 1935.	16.2
August, 1934..	16.6	January, 1936..	17.2
September, 1934	18.6	February, 1936.	16.5
October, 1934..	17.4	March, 1936...	15.5
November, 1934.	15.8	April, 1936....	14.3
December, 1934.	16.2	May, 1936.....	14.3
January, 1935..	16.2	June, 1936.....	15.3
February, 1935.	16.0	July, 1936.....	16.9
March, 1935...	15.9	August, 1936...	18.0
April, 1935....	16.1	Aug. 5....	17.9
May, 1935.....	16.0	Aug. 12....	17.9
June, 1935.....	16.5	Aug. 19....	18.3
July, 1935....	15.2	Aug. 26....	17.9

TABLE II. CARDED YARN MARGIN

Date	Margin in cents	Date	Margin in cents
August, 1933...	23.5	August 1935...	15.3
October, 1933..	20.0	September, 1935	15.4
January, 1934..	18.3	October, 1935..	15.8
April, 1934....	15.9	November, 1935.	16.3
July, 1934.....	14.7	December, 1935.	16.3
August, 1934...	15.3	January, 1936..	18.4
September, 1934	15.6	February, 1936.	17.5
October, 1934..	14.6	March, 1936...	16.8
November, 1934.	13.5	April, 1936....	15.6
December, 1934.	13.5	May, 1936.....	14.8
January, 1935..	13.5	June, 1936.....	14.6
February, 1935.	13.9	July, 1936.....	15.0
March, 1935...	14.4	August, 1936...	16.3
April, 1935....	14.1	Aug. 5....	16.4
May, 1935.....	13.8	Aug. 12....	15.4
June, 1935.....	14.5	Aug. 19....	16.9
July, 1935.....	14.3	Aug. 26....	17.2

Textile World's Price Index Numbers

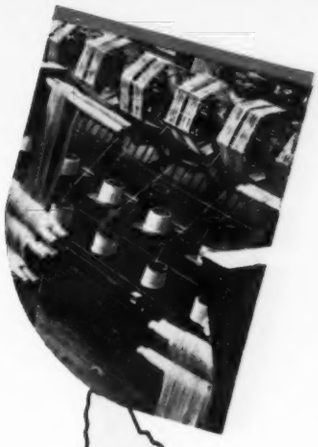
STARTING with January, 1936, TEXTILE WORLD has revised its price index numbers to a 1923-25 base, to correspond with current statistical practices. Those who wish to continue with indices based on July 1, 1914, for chart purposes or otherwise, can secure conversion factors to change the new figures to the old by writing TEXTILE WORLD, Statistical Dept., 1427 Statler Bldg., Boston, Mass. Figures on cotton manufacturers, Aug. 1, 1933 to Jan. 6, 1936 include processing tax.

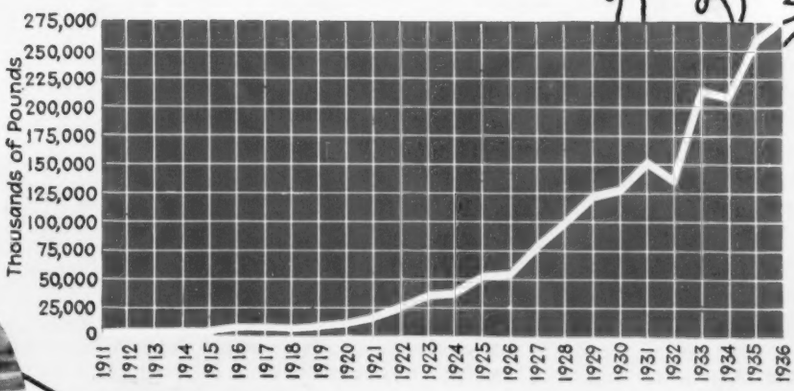
Date	Cotton Index Numbers: Cotton Yarns	Gray Goods	Colored	Wool Index Numbers: Wool	Tops	Yarns	Cloth	Silk Index Raw Silk	Rayon Index
1923-25	100	100	100	100	100	100	100	100	100
1930 ave.	50	61	61	72	58	61	72	90	109	46
1931 ave.	32	58	46	59	46	49	59	71	32	32
1932 ave.	24	37	37	60	36	40	52	57	21	28
1933 ave.	39	56	55	50	53	59	62	80	21	26
1934 ave.	61	67	70	62	63	70	75	91	17	25
1935 ave.	60	68	67	69	56	58	70	88	22	24
July 1935	61	68	65	69	56	59	70	89	20	23
Aug. 1935	58	68	66	69	56	59	70	89	23	24
Sept. 1935	55	66	68	69	58	60	70	89	25	24
Oct. 1935	57	68	68	69	60	61	73	92	27	24
Nov. 1935	60	70	69	72	62	65	75	92	27	24
Dec. 1935	60	71	69	72	64	66	76	92	26	24
Jan 1936	48	67	63	68	67	73	75	93	26	24
Feb. 1936	42	62	58	67	72	81	77	93	24	24
Mar. 1936	42	61	57	66	73	81	77	93	23	24
Apr. 1936	43	60	55	64	68	75	76	90	22	24
May 1936	43	57	54	64	67	75	76	90	21	24
June 1936	44	58	57	65	67	75	76	90	20	25
July 1936	48	61	61	70	69	75	75	90	22	26
Aug. 1936	45	62	63	70	70	75	74	90	23	26

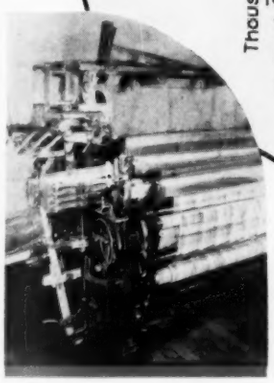
RAYON MANUFACTURE

in the United States

1911-1936







THE chart tells one part of the story. It shows the quantitative progress of the American rayon industry during its quarter-century of existence. From 364,000 lb. in 1911 to an apparent production of 275,000,000 lb. in 1936! (These figures are for rayon yarn only, and do not include rayon staple fiber.)

The 1936 estimate is based on the actual production of the first six months, plus a slight increase in the third and fourth quarters over the second quarter, whose output was decreased somewhat by flood damage.

The bulk of the increase, it will be noted, has been in the last 15 years; during the first 10 years the domestic industry made very slow gains. During each of the last two five-year periods—that is 1927-31 and 1932-36—there has been a 100% increase in output.

From a world standpoint, the United States continues to occupy No. 1 position, producing more than one-quarter of the entire world output.

But, as we indicated above, this is only part of the story. No chart, and no figures, can reveal the dramatic change which has been made in the product. The evolution from the weak artificial silk, with the glistening luster, of pre-World War days to the versatile synthetic yarns of today is one of the great industrial romances of modern history. Particularly noteworthy is the fact that part of this development spanned the greatest depression on record, and its song of success furnished a refreshing contrast to the blues which most industries were moaning at that time.

Into this quarter-century of progress have gone the vision and enterprise of an army of men: those who started the yarn producing companies themselves; the chemists and engineers identified with them; the builders and inventors of machinery, auxiliary equipment and accessories for use in the production and fabrication of synthetic fibers; the chief executives, operating executives and technicians in textile mills—and a host of others who, by their imagination and hard work, have created an entirely new industry during one short generation.

That consciousness, in itself, is ample reward for them. But there is more tangible recompense, too. Rayon has made, and is making, the textile industry a more troublesome but potentially more profitable field of endeavor. Moreover, the end is not yet in sight. In the past, we have asked our readers to keep their minds adjusted to the fact that eventually synthetic fibers may largely replace natural fibers. On this anniversary, we repeat that thought.

Douglas G. Woolf

RAYON COMPANY HISTORIES

American producers which have risen to maturity through brief quarter century

IN this section are presented interpretative histories of the various companies comprising the rayon industry. The effort of the rayon historian has been to portray not so much the specific growth or success of the companies, but rather the rise of the industry as a whole. However, industries, like nations, are made up of units, and the rayon industry is no exception. Thus the following really constitutes a composite history of the industry itself.

Perhaps the most striking feature of these histories is the very definite individuality that each company has acquired. All shared the common problems of pioneering with a new fiber, of evolving new technical and new merchandising policies to meet the new need. But there the parallel ends. Granting the obvious fact of competitive relationship, it is none the less clear that all companies, irrespective of size, have found their own separate markets to serve in meeting the ever-growing demands for rayon yarn.

Reading the histories in this light, the reader will be impressed by both rayon's accomplishments to date, and its promise for the future. The stories are essentially dramatic. However, their main significance lies, not in their dramatic flavor, but in the picture they present of a great industry which has risen to maturity through a brief quarter-century.

Viscose Co., Industry's First Born Was an Only Child for 10 Years

THE history of the Viscose Co., which was, from 1911 until 1921, likewise the history of the American rayon industry, starts off by upsetting one of the basic principles of a good "success story." Usually "success stories" open by depicting the hero's (in this case, the industry's) humble beginning. In the present instance, that would not be wholly correct. True, the initial output of rayon yarn at Marcus Hook in 1911 was a paltry 362,544 lb., against the Viscose Co.'s present yearly total of 100,000,000 lb., a contrast which might suggest that the birth of the American rayon industry was set in humble, cramped surroundings.

However, closer study of rayon's start builds up a rather different picture. Let us scan the preliminary facts briefly. In 1910, after various experimenters had spent some $1,500,000 in efforts to develop artificial silk, and a very crude yarn had actually been placed on the market by the short-lived General Artificial Silk Co., Samuel Courtaulds of Samuel Courtaulds & Co., London, who was already making artificial silk successfully in England, decided to start manufacturing the same yarn in this country. A company was formed under the name of the American Viscose Co., and 50 acres were bought at Marcus Hook, Pa., for a plant. In December of that year, the first skein of rayon was produced there and by summer of 1911, the plant was in active commercial operation. Considering that it was the first plant of its kind in the country, the Marcus Hook establishment was surprisingly modern and complete; physically it comprised one main building 130x400 ft., plus engine house and boiler room, a five-story structure for winding and sorting, and two additional small buildings. Departments included a laboratory with a staff of six chemists. Operating personnel totalled 500 workers, and plans were already under way to increase this number to 2,000.

A modest start—undoubtedly. But scarcely a humble one. The fact is that the birth of the industry was favored by various advantages—among them skillful, far-sighted planning; adequate financing; and wise advice from those already experienced in the field. The present position which the Viscose Co. holds in the rayon industry, may be ascribed in part at least to the sound and substantial basis of its beginning. Analyzing the successful growth which this company has enjoyed through those 25 years, two attributes stand forth—good management and clear vision. These attributes have manifested themselves in five major policies: (1) Price stability; (2) quality standards; (3) quantity production to provide for volume needs of largest customers; (4) diversity of product, including development of new types; and (5) identification of product through the company's Quality Control Plan.

That these policies were consistently adhered to is shown in the company's subsequent history. Conscious from the start of rayon's basic advantage in being 100% man-controlled, the company held its price changes to the minimum, both as regards frequency and size. In the earliest days of 1911, 150 denier, the only size made, was selling to a few somewhat skeptical manufacturers of half-hose at $1.85 per lb.; it reached its high point of $6.00 in 1920, and has been gradually lowered since that time. Through this whole evolution, the aim of the Viscose Co. has been to maintain price stability. With respect to quality standards, second major policy, the company's contribution has been broad and significant. The most notable development undoubtedly was the establishing of technical yarn specifications and qualities.

The company's record regarding quantity production is really a chronology of steadily expanding capacity. Between 1911 and 1920, while still the only company in its field, the Viscose Co.'s output grew about 1,000%. In 1917, the Roanoke, Va., plant was added; in 1921 the Lewiston, Pa., unit; erection of the Parkersburg, Va., plant in 1925 added another 10,000,000 lb. to the company's constantly growing business; while 1927 marked the completion of the second Roanoke, Va., unit which, with a capacity of 17,000,000 lb., was the largest rayon plant in the world.

Meanwhile, other important changes were taking place with respect both to yarn manufacture and to customer demand. Cellulose acetate yarn, introduced to the American market about 1917 by the now defunct Lustron Co., won wide popularity during the subsequent 10 years; consistent with this trend, the Viscose Co. in 1928 opened its first acetate plant at Meadville, Pa. Subsequent years have brought further developments necessitating added output in various fields and at present the company has three major expansion moves

scheduled: (a) to double its acetate output, now totalling about 10,000,000 lb.; (b) to build a plant at Nitro, W. Va., to make cut rayon staple by the viscose method; and (c) to build a new viscose plant, the site for which has not yet been selected.

While meeting quantity requirements, the company's steady expansion through the years also facilitated developments as regards number four of its major policies—diversity of product including new types. With the introduction of dull viscose yarn in 1926 and dull acetate yarn in 1931 important new markets were opened. The development of the dull-luster yarns, together with the constant improvements in existing yarns—especially the trend toward ever-finer deniers—served to materially increase the uses for rayon, adding various new outlets.

However, this expansion brought its own problems. Chief among these was the tendency of certain rayon-consuming branches of the woven fabric industry to use the yarn for the manufacture of inferior merchandise, a trend that caused increasing concern among rayon producers, since it threatened to impair the prestige of the growing industry. Having previously faced this hazard in the late twenties, when rayon was used to make inferior knitted underwear garments, the Viscose Co. decided to set up specifications for its customers. In 1930, the company introduced its now famous quality control plan, which provided that use of the company's "Crown" label would be restricted to customers whose products conformed to standards set up by the Better Fabrics Testing Bureau. This was a pioneer move; never before had yarn producers attempted to control their yarn's use to such a degree. It proved quickly successful and was hailed by both textile manufacturers and competing producers as beneficial to all related branches of the industry.

Such then is the history of the Viscose Co.'s physical growth and success. It is an impressive record, measured by statistics alone. But, the question arises: Whence came the motivating power behind this growth? That question may be answered only in personalities. The story of the Viscose Co. is—to a greater extent perhaps than that of any other rayon producing company—the story of one man.

The name of Samuel A. Salvage has been associated with this company since—indeed, even prior to—the formation of the company by Samuel Courtaulds in 1911. Young Mr. Salvage first saw the possibilities of artificial silk in 1903 when, as manager of the yarn department of Hardt Von Bernuth & Co., commission merchants in New York, he sold artificial yarn that was imported from Germany. Shortly thereafter he established his own business and imported Courtauld's artificial yarn from England. A close business association developed between Mr. Salvage and Mr. Courtaulds, and the outcome was that Mr. Salvage persuaded the English manufacturer of artificial silk to buy the American rights to the viscose process and to build a plant in this country.

When the Viscose Co. was formed in 1910, Mr. Salvage assumed charge of its sales; his subsequent rise dates from that time. Made vice-president in 1923, Mr. Salvage was elected president in May, 1925, to succeed Dr. C. A. Ernst, who retired. Today, after eleven years of service as president of the largest rayon company in the world, he is generally acknowledged to deserve the term which has been applied to him—"dean of the rayon industry."

MANY NEW DEVELOPMENTS AHEAD

"IT SEEMS REASONABLE to expect rayon to continue growing during the next 25 years by means of the factors which have brought about its growth during these last 25. It is quite possible that in the years to come rayon will be produced with more elasticity, its strength will probably be increased, and it will undoubtedly be made finer than any today. It is equally possible that fast dyes will be found for acetate rayon, that it can be generally printed and that it may be made into crepe.

"These are points on the frontier of today's exploration; of course entirely new processes and methods can revolutionize the industry. Spun rayon is only starting in this country; its general and satisfactory use in Europe seems to insure a steady development here, but that development should be slow, to avoid unnecessary set-backs. Technical improvements and development of the fiber will insure its progress in the textile field. It is not certain that spun rayon yarns will always pass through all the regular spinning processes of cotton and woolen mills. It is quite possible that the fibers can be kept parallel from the start and some of the usual processes avoided.

"The natural fibers are, during their growth, subject to the whims of weather and health, but rayon is controlled in all its processes. So long as it remains subject to man's ingenuity, it will be improved in uniformity and quality."

SAMUEL A. SALVAGE
President, The Viscose Co.

Well Balanced Planning Marked DuPont's Rise

THE popular adage of "pick your parents" as a rule for success seems to find confirmation in the case of the DuPont Rayon Co. Certainly the prestige inherited by this company from its parent company, E. I. duPont de Nemours & Co., has proved a valuable asset, while the availability of the elder firm's market analyses, surveys and other services, was an important factor in starting the rayon company upward.

All of which must not be viewed as detracting in any way from the DuPont Rayon Co.'s record as an individual unit. The company has always been fortunate in having competent leaders within its administration. Paramount among these, of course, is Leonard A. Yerkes, who has been president ever since 1920, when the rayon firm was first organized as the DuPont Fibersilk Co. Probably the most significant aspect of the relationship between the DuPont Rayon Co. and the parent company is the fact that a close and valuable spirit of cooperation could prevail without in any way impairing the autonomy of the rayon unit. A major contribution by Mr. Yerkes has been his successful application and interpretation of various DuPont services to the rayon industry's needs while always retaining for his own company that freedom of action so essential to individual growth.

The career of the DuPont Rayon Co. has been a swift-moving story of many highlights, carrying the company constantly upward from its first Buffalo plant in 1921, capacity 1,500,000 lb., to its present total capacity of 40,000,000 lb.

The company has numerous significant pioneering accomplishments to its credit. Among these are two which have made rayon history: (a) developments of "super-extra" fine filament yarn, 1924; and (b) introduction in 1926 of staple fiber, in which field DuPont stood alone for nearly a decade.

To these two developments must go credit for much of rayon's progress to date, and for future progress in important new paths just opening. Development of "super-extra" yarn showed rayon's possibilities in transparent vel-

vet and constituted a major contribution to development of the lightweight pile fabrics. Likewise, DuPont's persistence in promotion of staple fiber through the years was largely responsible for the present "boom" in that division.

Viewing the company's history from the merchandising side, a similar picture of far-sighted initiative unfolds. The market surveys of the Fabric Development Department are too well known to need detailed review here. They have become accepted reference works for the industry, and are sometimes used as the bases of surveys by other companies. Equally important was the gradual expansion of the promotion and advertising department, which has increased steadily both in size and significance during the years. These two developments may be viewed as the highlights of the company's broad merchandising organization. This merchandising division embraces various other important phases, notably two: (a) the service of the Paris Style Office, a parent DuPont unit, which supplies the rayon company's customers with important style trend data; and (b) the DuPont Exhibit on the Atlantic City boardwalk, which since its introduction many years ago has become widely known as a medium for promoting rayon fashions.

With respect to production, the company's record is one of expansion soundly regulated by needs. The Buffalo, N. Y., viscose process unit has been enlarged steadily through the years. But this increase proved insufficient to meet the rapidly expanding business and in 1925, another viscose process plant was placed in operation at Old Hickory, Tenn., and later a third plant at Richmond, Va. As the market prospects for cellulose acetate yarn took a pronounced rise, the company determined to add a unit for manufacture of that type yarn. Land was bought at Waynesboro, Va., and in 1929 the plant was completed, with a capacity of 3,500,000 lb., which has since been substantially increased.

In all, the DuPont company's story is one of healthy growth, based on a careful balance between conservatively planned expansion of plants, and aggressive exploitation of constantly widening outlets. The company, with Mr. Yerkes as its head, has come a long way since the original DuPont Fibersilk unit was formed in combination with the Comptoir des Textiles Artificiels, but its fundamental policies are unchanged. Today it occupies an enviable position among rayon manufacturing companies of the world, with all signs pointing to an equally enviable future.

Industrial Rayon, a Veteran, in Top Flight of Producers

ONE of the veterans of the synthetic fiber industry is the Industrial Rayon Corp., of Cleveland, Ohio. Twenty years is a long time in that industry, and early next year will mark 20 years since the start of production by Industrial's first predecessor, the National Artificial Silk Co. Incidentally there is an interesting international flavor in the company's background. The National Artificial Silk Co., was succeeded by the American Borvisk Co., operating under the method developed by Borvisk, a Russian. In 1920, the Industrial Fibre Corp. of America was organized and merged with the American Borvisk Co. Snia Viscosa, of Italy, had a controlling interest in the new company. In 1925, the Industrial Rayon Corp., was organized by Americans to acquire the stock of Industrial Fibre Corp. Subsequently, in 1928 Industrial Rayon acquired all the assets and became the operating unit.

The growth of the company has been phenomenal. Its output, which initially was three or four hundred thousand pounds a year, has grown into many millions. It is not within the company's policy to release figures on its capacity; however, it is now in the top flight. In addition to its plant at Cleveland, which was increased many times its original size, the company erected another plant at Covington, Va., which started in 1929. Both plants have always operated under the viscose system. Specializing originally on the heavier deniers, the company has extended its operations from lustrous to delustered and finally to pigment yarn, and to various deniers and filament counts, in accordance with the demands of the trade. Early in 1931, it developed a new soft-luster yarn which it marketed under the name "Spun-Lo."

In several directions, the company's technical progress has been significant. In 1934, it introduced spun-dyed yarns, the fiber having been dyed in the solution before the spinning process. Just this year, it was announced by H. S. Rivitz, president, that the corporation had developed a new process which would enable it, in one continuous operation, to spin, chemically treat and finish a yarn of superior quality, bleached, twisted and ready for coning. This month he announced completion of preliminary plans for erection of a new 10,000,000 lb. plant to cost about $7,500,000, to make rayon by the new process. Industrial is also developing a machine to make staple fiber.

In the development of its merchandising set-up, also, Industrial Rayon has made news. In 1931, it started the manufacture of circular knitted fabric from its yarn. Mr. Rivitz stated then that the primary motive of this step in vertical integration was "to lead the way in establishing a semblance of order in an industry that has been thrown into chaos which has resulted in constantly lower prices and the resultant aftermath of questionable marchandise to meet constant and unwarranted lower prices." Since then, this phase of the company's business has increased steadily and rapidly.

Industrial's promotional activities have kept step with its technical achievements. The *Premier Rayon Review*, which it published for some time, contained articles by nationally and internationally known men and women. The company's present plans call for increased effort, the 1936 advertising appropriation being double that of 1935. Formerly confined to trade-paper advertising, supplemented by department-store promotion work of an individual character, the program has been broadened to embrace consumer type of publicity in popular household magazines, rotogravure sections of Sunday newspapers, and sales promotions of many types, supplemented by a few leading trade papers.

Quality-Plus a Name— That's the Celanese Story

IF anyone were to ask the Celanese Corp of America Shakespeare's classic question, "what's in a name?", that company, like as not, would reply, "there's millions in it if the quality of the merchandise is right!" Truly, name-promotion has been so preeminent, and successfully so, in the Celanese

Corp.'s growth, that it must be considered as a basic plase in any analysis of the company's history.

However, as the Celanese Corp. likewise would point out, the name did not win international acceptance, by itself. It was backed from the start by well-defined standards as regards both yarn and fabric manufacture. And assuredly the company's successful growth is traceable to these two factors.

Celanese Corp. has an interesting history. Its earliest inception was in 1904, when Drs. Camille and Henri Dreyfus commenced, in a small laboratory in Switzerland, their efforts to discover a method of spinning cellulose acetate yarns. After the usual ups and downs that attend pioneering work, they were finally ready, in 1914, to start manufacture. However, the war delayed their plans, and it was not until January, 1918, that the American company finally was incorporated in Delaware under the name, American Cellulose & Chemical Mfg. Co. Land was bought near Cumberland, Md., a plant erected, and within a year the company was selling acetate yarns to the American market. This began the presentation of acetate yarn to the American trade on a substantial scale.

The American Cellulose & Chemical Mfg. Co. progressed rapidly. Five years' experience brought the company to two important decisions both destined to shape the future course of the organization. In 1924, the firm installed looms at its yarn plant and began manufacturing fabric, and the same year the name "Celanese" which had already won popularity, was registered. Other key dates in the company history are: May, 1927, when the corporate name was changed to include the now widely known term "Celanese"; September, 1927, when contracts were awarded for additions to the plant to substantially increase capacity; and April, 1930 when Dr. Dreyfus was issued patents covering the manufacture from cellulose acetate yarn of textile fabrics having permanent moire effects.

The last-mentioned development accentuated the possibilities for Celanese Corp.'s very successful permanent moires. Thus Celanese was a pioneer in the introduction of these fabrics in the synthetic yarn field.

Meanwhile, through constant improvement in yarn and equally steady fabric development work, the company was widening its markets. The memorable all-Celanese voile, which first appeared about 1927, a new member of the synthetic textile family, was joined by many other weaves, marquisette, ninon, taffeta, satin, etc. By this time, the Celanese Corp. had become a force to reckon with in synthetic textiles. The position the company had enjoyed as the chief manufacturer of cellulose acetate yarn in the country for nearly a decade, was nearing its end. Other companies announced plans to enter that branch of the industry. Meanwhile, however, its priority in the field, plus merchandising and technical initiative, had given the Celanese Corp. a firm hold on the market.

The contributions by the Celanese Corp. to the industry's technical advance have been many. In addition to those already mentioned may be cited: Delustered printing of fabrics, development of men's lining fabrics, fused collar. In the yarn field the company has introduced special yarns for men's summer suitings of Celanese and special knitting yarns. In all, the company holds more than 70 patents on synthetic yarn and fabric developments.

Consideration of the Celanese Corp.'s merchandising policy brings us back at once to the importance of the brand name. In truth, the company places emphasis on its name to a degree not equalled by any other company in the synthetic textile field. It is claimed that the name "Celanese" represents a financial outlay unparalleled in the industry. Consistent with this, the Celanese Corp. has always refused to join the "rayon" family, holding that this generic term is not applicable to its product because Celanese yarns and fabrics are organically different from any of the "rayon" yarns.

Likewise, consistent with the same policy has been the company's merchandising efforts. In 15 years the firm's sales promotion has had two main phases. For the first decade the company put most stress on selling its immediate customers. A decided success crowned this effort. Then about 1930, the merchandising effort widened to include retailers and consumers. Since 1931 many leading stores have installed Celanese sections as separately identified units.

Throughout the history of the company, the use of the name "Celanese" by the firm's customers has been carefully restricted to apply to quality merchandise.

Tennessee Eastman Beats Depression by Increasing Sales 10 Times

ONE million pounds of acetate yarn sold in 1932; ten million sold in 1935; and a present producing capacity of 17,000,000 lb. annually, based on 150 denier. That is the record of Tennessee Eastman Corp., Kingsport, Tenn., during the "depression." (The quotation marks are necessary in this case.)

Tennessee Eastman combines age and youth. Its parent company, Eastman Kodak Co., in Rochester, N. Y., is the oldest American manufacturer of cellulose acetate, having produced that material for film-making for more than a quarter of a century. On the other hand, the yarn subsidiary itself is the youngest of the major synthetic-fiber producing companies in the country.

1932 was virtually the first year of production and sale of Eastman acetate yarn. Back of that year, however, there was in addition to the quarter-century of experience in producing the raw material—a period of three years in experimental and semi-commercial development of the yarn end.

The spirit of research which impelled the company to go through that waiting period before the product was pushed on a commercial scale is characteristic of the parent company. Officials of Tennessee Eastman give much of the credit for the rapid progress made in the yarn end to the fact that they have had the benefit not only of the research men in Kingsport, but also of the research laboratory in Rochester. At both places, special laboratories have been fitted up, and a large force of technicians work continuously on research and development.

This approach also characterizes the merchandising end. A. M. Tenney Associates, Inc., New York, sole sales rep-

STILL SOME TO GO!

"WE FEEL THAT there is much more to be accomplished in the development of acetate yarn, and that the field can be widened and still better results obtained. I believe that one of the largest manufacturers of automobiles made the statement that it would take many more years to perfect the automobile. The manufacture of synthetic fibers is a younger industry and consequently it wold seem reasonable that we may look forward to many years before they reach their ultimate use and perfection."

P. S. WILCOX,

President, Tennessee Eastman Corp.

resentatives for Tennessee Eastman, have concentrated on the development of new fabrics and on broadening the field for acetate.

As the result of its effort toward technical improvement, the company's product is of course much better today than it was at the start. In commenting on this progress, P. S. Wilcox, president of Tennessee Eastman Corp., makes this interesting point: that the tremendous reduction in price since the company first went into the acetate yarn field has been made possible only because of many improvements and economies in production methods. "No one expected in the early days," said Mr. Wilcox, "that acetate yarn could be made to sell at the price of viscose, and in the case of certain deniers even lower."

In addition to improving the quality of the yarn, the company has also extended its versatility. At first, only bright yarn was produced; later dull-luster yarn was supplied, and now the company also makes a black yarn. In addition, it has gone into the production of acetate staple. It is not the policy of Tennessee Eastman to produce fabrics or goods of any kind.

Reference was made previously to the distribution set-up. It is interesting to note that in 1934 Tennessee Eastman Corp. was awarded honorable mention for the best photograph appearing in trade paper advertising at the annual exhibit of advertising art held in Rockefeller Center, New York. The advertisement which won the award appeared in the April, 1933, issue of TEXTILE WORLD.

Romance and Drama Mark Tubize Chatillon History

THERE is nothing dull about the story of Tubize Chatillon Corp. It throbs with romance and drama.

The romance is found primarily in the fact that for years Tubize was the only American firm producing synthetic yarn by the Chardonnet or nitro-cellulose process, the original method discovered by Count de Chardonnet in 1884.

The drama developed in 1934, the golden anniversary of the Chardonnet discovery, when by strange coincidence the company announced its intention to discontinue operation under the nitro-cellulose process. Thus, in the year when the memory of the father of rayon was being honored, the last plant in the world using his method was closed. This development was made still more dramatic by the fact that the immediate cause of the company's decision to discontinue its nitro plant at Hopewell, Va., was a protracted labor disturbance which closed the plant and made the expense of re-opening financially inadvisable.

Obviously, this change made a great difference in the stature of Tubize Chatillon—and many "smart" observers in the industry predicted that it was the beginning of the end. The way in which the company fooled those forecasters was one more dramatic chapter in its history. By progressive expansion in its viscose production, Tubize Chatillon advanced to a capacity of 11,000,000 lb. (of which 1,000,000 is acetate) in 1936—and has recently completed plans for a new viscose unit which will get into operation in June 1937 and give a total capacity of 17,000,000 lb. (still 1,000,000 acetate) in 1938.

And that, for a company which started with an output of 623,000 lb. in 1920, is not so bad.

In that first year, 1920, the company was organized as the Tubize Artificial Silk Co. of America, controlled by the Fabrique de Soie Artificielle de Tubize, of Belgium. It produced nitro-cellulose yarn exclusively—and more and more tended to specialize in finer sizes with the result that by 1925 it was the largest manufacturer of the finer deniers in the country.

The prelude to the company's major corporate change came in 1929 when Tubize, jointly with the American Chatillon Corp., organized the National Acetate Silk Co., to produce acetate yarn. Actual merger of Tubize and Chatillon in 1930 resulted in the Tubize Chatillon Corp., which thus became the only concern in the country manufacturing synthetic yarn by three processes, since American Chatillon produced both viscose and acetate yarn at its Rome (Ga.) plants. Subsequently, as noted above, the nitro division was discontinued.

The next major step in the company's development was the establishment of a plant for knitting, dyeing and finishing of circular knit rayon fabric at Hopewell, Va., in 1933.

Technically, the Tubize Chatillon's most important development was the delustering of rayon by use of pigments under the now-famous Singmaster patents. The resulting yarn was called Chardonize and this distinctive delustering method has since become standard in the industry.

In merchandising, the outstanding move was the development of a plan for building consumer confidence and acceptance for hosiery and underwear made of Chardonize yarn through advertising Chardonize directly to the consumer in mass markets. This plan, adjusted to present day trends and conditions, has been followed consistently right up to the present time.

Finally, it is the established policy of the company to concentrate all merchandising and sales development efforts in carefully selected channels of distribution, particularly in the knitting fields.

Bemberg Blazed Trail in Fine Filament Field

THE American Bemberg Corp. calls its product "the aristocrat of man-made yarns." If having an impressive family tree makes a company aristocratic, then assuredly the Bemberg Corp. has prior rights to that term. Because the name Bemberg, believe it or not, has been associated with textile manufacture for nearly a century and a half. It was in 1792 that the original J. P. Bemberg company was formed in Germany; at that time its activity was limited to textile dyeing.

The American company, of course, is

FULL IDENTIFICATION NEEDED

"THE AMAZING TECHNICAL progress that has been made in the manufacture of synthetic yarns during the past quarter century has developed the industry's product to a point where it needs no apology. During the years ahead a primary responsibility of the industry will be to 'identify' the product through to the public as completely and in as far-reaching a manner as possible. The interests of all factors concerned will best be served by candid and complete identification of all synthetic yarn merchandise at the point of sale."

S. R. FULLER,
President, American Bemberg Corp., and North American Rayon Corp.

a much younger unit. It was formed in July, 1925, under patent arrangements with the original Bemberg company, of Barmen, Germany. Land was purchased at Elizabethton, Tenn., at once; preliminary operations in making artificial silk by the cuprammonium process were started, and a year later, Oct., 1926, the company was on a commercial basis. The Bemberg Corp., in common with the rest of the rayon industry, shows a record of rapid and successful growth. From an initial capacity in 1926 of 2,000,000 lb., all of which was 150 den. 112 fil., the company has steadily increased its output until today it has a capacity of 10,000,000 lb. with a range extending from 30 den. 24 fil. to 30 den. 224 fil.

Favored from the start with a process which could produce yarns of exceptional fineness, the company's technicians have concentrated through the decade in developing yarns of ever finer filaments, which in turn enabled the company to win wide acceptance in the fine fabric field. It may safely be said that one of the Bemberg Corp.'s most significant contributions to the synthetic textile industry has been the opening of markets in the field of high-priced merchandise where chemically produced yarns hitherto had not been accepted.

This market expansion was made possible by various pioneering technical developments. Most significant of these was the perfection of the stretch-spinning process. This method, on which the company holds exclusive rights, makes possible the production of exceptionally fine filaments. Since February, 1929, when Bemberg set a new high mark for the synthetic textile industry by announcing the perfection commercially of a 15 den. 24 fil. yarn, the company has moved forward steadily in the same direction.

Other high points in the company's history are: August, 1932, Bemberg entered the staple fiber field, with a yarn cut and sold by Nyanza Mills which lent interesting "wooly" effects to plain, crepe and novelty fabrics, and which has since become a growing division of the company's line; February, 1935, announcement of new fine denier, fine filament yarns, available for sheer woven fabrics which made possible the current very profitable business Bemberg enjoys in triple-sheers, ninons, taffetas, etc.; December, 1935, introduction of black spun yarns.

Bemberg's accomplishments in the field of triple-sheers warrants a paragraph to itself. Entering that branch some five years ago, the Bemberg yarns served to explode another theory about the limitations of synthetic yarns, by proving their adaptability for high quality sheer fabrics. Further technical progress has made possible continued expansion in this market. So popular have the Bemberg triple-sheers become that this line is now a major market for the company's yarn. Among other important markets with which Bemberg has become identified is the full-fashioned hosiery field, where the yarn has won widespread popularity.

Steady growth in the company's business brought proportionate need for expansion of plant, and in 1928 a second unit began operating at Elizabethton which doubled the output of yarn. Meanwhile, the company's merchandising policy has crystallized. The name "Bemberg" had become definitely established and registered to cover all merchandise made from this yarn, with, of course, the necessary precautions against the use of the name on other than standard merchandise; March, 1928, marked the start of a nation-wide Bemberg advertising drive to familiarize both the trade and the public with the company's product; since that date, the company has followed a policy of aggressive merchandising, with major emphasis on the name "Bemberg." In common with another leading producer of synthetics, the American Bemberg Corp. has consistently declined to accept the term "rayon" as descriptive of its product made by the cuprammonium process. Through well-planned and continuous promotion among both the trade and the consumer the company has built up acceptance of the trade name "Bemberg."

American Enka Rises to 20,000,000 Lb. in Seven Years

PERSONAL contact with yarn consumers—a policy which has been followed with meticulous thoroughness since the first skein of Enka rayon passed through the drying chambers in October, 1929—may well be accepted as the secret of the steady growth of the American Enka Corp. Within the short span of seven years Enka's business has grown from its initial yarn output of 768,970 lb. in 1929 when the Asheville, N. C., plant started operating, to 20,000,000 lb. capacity this year.

Organized in 1928, to make viscose process yarn under licenses from Dutch Enka, the company was favored (a) by strong leadership in the person of F. H. Fentener van Vlissingen, as president, who brought to his task wide rayon manufacturing experience with Dutch Enka; and (b) by very adequate financing, having a paid-up capital of $16,000,000 cash. Then, too, the company had an unusually clear concept of the place it aimed to fill in the rayon industry. Entering a field which was already well established, the company decided that its best prospects lay in direct contact with its trade.

The history of the company through subsequent years serves to attest the wisdom of this original policy. The business widened steadily, necessitating almost constant expansion at the Asheville plant; to its first modest output of bright 150 denier 2 filament yarn, other sizes were gradually added until today the company makes all lusters in sizes ranging from as high as 100/100 to as low as 300/60. Selling at first through distributors, it logically followed, in view of the company's insistence on personal customer service, that direct selling was advisable. In October, 1930, therefore, the company took over its own distribution, placing this under C. M. Carr, vice-president, who organized a strong sales unit which today handles the entire Enka output.

A further significant step toward closer contact with the trade was taken in 1931, when a laboratory was installed at the firm's New York sales office. This laboratory, which operated in conjunction with the technical department at the plant, proved immediately popular among mills, converters, wholesalers, and retailers, since it gave them in their own territory, valuable technical guidance on Enka yarns and merchandise made therefrom. Today that laboratory is part of a comprehensive merchandising structure and operates

SURFACE NOT YET SCRATCHED

"SO FAR AS THE FUTURE of the rayon industry is concerned, we have not scratched the surface. In view of the remarkable development in the rayon industry in the last few years, the uses for rayon will broaden considerably and by reason of the development of finer yarn the possibilities will be in the finer fabrics. Rayon started its development in the inexpensive fabrics and now is up at the top. I am confident rayon will hold the popular-price market and will yet go further into the finer types which field rayon is rapidly developing."

C. McD. CARR,

Vice-president, American Enka Corp.

in close relationship with the company's style service. The keystone of this merchandising structure is the Enka "Fashion Approved" tag which today enjoys general acceptance as a quality emblem. The tag is used only on merchandise which conforms not only to strict quality specifications covering fabric manufacture, but also to finishing, and proper styling. At the retail end, its use is restricted to merchandise sold in the quality stores.

This merchandising activity was paralleled with technical progress. To its original bobbin spinning plant the company in 1931 added a pot spinning plant and now operates both. Likewise the company has developed and patented equipment and processes to improve bobbin spun yarn for eliminating dyeing differences.

Add to the above picture of company growth, the asset of unusually harmonious and enlightened labor relations with its 2500 employees, an advantage gained through what A. J. L. Moritz, technical vice president in charge of operations, has described as recognition of the company's "fundamental obligations"—and you have the story of why Enka, newcomer to the rayon industry a brief eight years ago, now stands among the important and successful manufacturers of rayon.

Fashion Fabric Development Marks North American's Growth

RAPID-FIRE progress is no novelty in the rayon industry. However, the record of the North American Rayon Corp., in increasing its business 2000% during the short period of nine years is a notable accomplishment, even in this fast-growing field. Plans for the formation of this company were being considered in 1925, simultaneously with those for organizing the American Bemberg Corp. Representatives of the Vereinigte Glanzstoff Fabriken, A.G. of Alberfeld, Germany, which had been making yarn by the viscose process there for some years, took definite steps to organize the American company.

The company was formed in 1927, under the name of the American Glanzstoff Corp., and a plant was built adjacent to the Bemberg plant at Elizabethton, Tenn. Both in technical development and in merchandising emphasis the new company focused on the woven fabric field. So successful was its effort in this direction that the company has increased its output from the original 1927 capacity of 1,000,000 lb. to its present capacity of 20,000,000 lb. Likewise its diversity of product has increased; the first yarn made was 150 den. 32 fil., followed soon by 100 den. 40 fil., and by many others until today the range runs from 60 den. 60 fil. to 300 den. 46 fil.

The chief steps in the increase of capacity at the plant were: 1930, enlarged to permit output of 7,000,000 lb.; 1931, another enlargement more than doubled the capacity, raising the total to 15,000,000 lb.; 1934, other units were added, giving a present day capacity of 20,000,000 lb. The company has made numerous important contributions to rayon's progress. Foremost among these was the development of a 6 den. 60 fil. yarn which was placed on the market in 1934. This represented the finest rayon yarn developed commercially up to that time.

Reflecting the general trend of the industry to emphasize the term "rayon," the American Glanzstoff Corp. in May, 1934, changed its name to the North American Rayon Corp. Meanwhile, the company had been winning increasing acceptance for its yarns in all the chief branches of the woven fabric field, as well as enjoying a good demand from knitters. Steady improvements in the yarn carried it into a widening range of fashion fabrics, including the standard apparel fabric constructions such as taffetas, crepes, satins, velvets, and also the jacquard group embracing draperies, bedspreads, etc. Incident to the change of name in 1934, the company expanded its merchandising activity, and with notable success. A company trademark, designed by Howard Chandler Christy was registered and promoted; the slogan "Rayon at its Finest" was adopted. Both of these have now won wide acceptance as representing high quality viscose rayon merchandise.

Skenandoa Invaded Cotton's Stronghold

THE formation of the Skenandoa Rayon Corp., at Utica, N. Y., in 1925 to occupy the plant formerly operated by the Skenandoa Cotton Co., evoked widespread interest for three reasons. First, there was romance—although bitter romance to some—in the fact that rayon, the textile infant, was usurping the manufacturing stronghold long held by its elder, cotton. At that time, the industry had not become as calloused to the precocious behavior of synthetic fibers as it is today.

Second, the officers and directorate of the newly formed company included many officials of important knitting mills, consumers of rayon. Third, the company had an arrangement with Dr. Emile Bronnert, of France, an outstanding rayon technician, for advisory service.

Skenandoa has confined itself to the viscose process and has continued at Utica, but of course has expanded in size. One of the most important steps in the program of expansion was completed early in 1930 and represented an expenditure of $3,000,000.

Specialization Aids Delaware Rayon

FLEXIBILITY of equipment to permit production of a large number of specialty yarns within a limited volume range has been a major characteristic of the Delaware Rayon Co. since this firm was first organized in January, 1926. Starting with an output of 100,000 lb. annually, this company has grown steadily until today its plant at New Castle, Del., has a capacity of 4,000,000 lb. Using the viscose process, the company first produced bright-luster viscose yarns; to this were added dull pigment yarn in 1933 and semi-dull in 1934.

Its policy of concentrating on specialty yarns has built up for the Delaware Rayon Co. a substantial market in textile divisions where specialty fabrics are predominant. Continuous and extensive technical development work has enabled the company to add various new yarns to the rayon family, notably in the field of flat filament, slub and pigment yarns which have enjoyed wide-spread acceptance.

Woonsocket Doesn't Worry Over Sales

ORGANIZED early in 1928 by the Manville Jenckes Corp. to provide that company with a permanent source of rayon yarn, the Woonsocket (R. I.) Rayon Co. is unique among yarn producers in one respect, at least: It does not have to worry about merchandising problems. This has proved a material

advantage in that it permits the company to concentrate more fully on the three major aspects of its management policy. These aspect are: (a) constant improvement in yarn quality; and (b) technical and mechanical improvement to increase production per spindle over original estimated production per spindle; and (c) decreasing cost of manufacture by first, increased spindle production and, second, technical developments in processing.

How successful the company has been in its effort to lower production cost is evident in the fact that between 1933 and 1935, through an investment of $58,569 for improvements the company effected an annual saving in production cost of $159,775. (See December, 1935, TEXTILE WORLD).

Woonsocket started production in February 1929, with an output that year of 254,324 lb. Its production has increased steadily to 2,386,936 lb. in 1935. The company uses the viscose process, and makes only one yarn, 150 den. 48 fil., bright, which goes extensively into linings, underwear, drapery and jacquard fabrics, sold in the gray by Manville Jenckes. Limitation of line to a single yarn is another unique advantage of the company as it permits 100 per cent concentration on the perfecting of that unit.

New Bedford Defied "Depression"

STARTING business in June, 1929, just four months before the stock market crash ushered in America's lean years, the New Bedford Rayon Co. can point in particular pride to its record of growth. With all the economic and industrial tides against it, this company has expanded steadily, and on a very sound basis, through the depression and post-depression years. The New Bedford Rayon Co. began making viscose process yarn at its plant at New Bedford, Mass., in June, 1929, the plant having an initial capacity of 500,000 lb.

During subsequent years the plant has been enlarged three times and today it has a capacity of some 4,500,000 lb. Likewise the range of its product widened, from 150 den. 40 fil., bright yarn, which was the only yarn made by the company in 1929, to its present range which includes all deniers, both bright and semi-dull, in skein and package forms.

The success of the company might best be ascribed to two major policies which have governed its administration since the start: (1) persistent pioneering work in yarn development; and (2) aggressive promotion on the merchandising side.

STATISTICS SHOW GROWTH

"OVER THE LAST 25 years, America has changed from a country depending on small imports of rayon to one with a self-contained and important domestic rayon industry. And more recently the growth of rayon staple fiber production promises to unfold a whole new range of products for this industry.

"The development of a complete rayon statistical program by the producers in the early thirties is significant in itself. Rayon was no longer a 'local product'—it had reached into every nook and corner of the textile industry. The industry had reached a 'public stature' and the need for authoritative data on rayon was felt not only by the producers themselves, but also by thousands of fabricators, processors, and distributors. Thus the creation of this statistical program was important not only as it provided a working tool, but also because it marked a milestone of public recognition in the industry's first quarter century.

"Over this twenty-five-year period, rayon's change in name also is indicative of its growth. First called 'artificial silk,' the word 'rayon' was adopted in 1924. And now, in recent years, we have the expression 'the new rayon' which connotes the ever-increasing quality and usefulness of this man-made fiber.

"Truly a twenty-five year record of which to be proud! But also a great challenge to accomplishment in the next quarter century!"

STANLEY B. HUNT,
Textile, Economics Bureau, Inc.

Three-Ply Progress Hartford's Policy

THIRTEEN years have passed since a small group of far-sighted men, headed by Theophile Guerin, filed papers in New Jersey for the incorporation of a rayon yarn manufacturing company to be known as the Belamose Corp.

The history of the Belamose Corp., which last year changed its name to Hartford Rayon Corp., has been marked by steady progress in three vital channels of rayon development; (1) yarn improvement, (2) yarn diversification, and (3) active merchandising. The company started commercial production of viscose process yarn at its plant at Rocky Hill, Conn., in the summer of 1924. The original plant comprised one main building, 600 x 230 ft., and several smaller structures. Trade response was prompt and demand increased, necessitating expansion which was begun in September 1925. In the second half of 1925 the plant had a capacity of 500,000 lb. yearly. By August 1926, the company had completed an expansion program giving the plant 1,250,000 lb. yearly capacity.

Meanwhile, various new yarns were added, and this program of diversification has continued until today the company's range spans the whole field of standard viscose sizes. An important step was the company's decision in 1928 to sell direct. In line with this trend toward closer customer contact, the company also organized a department of sales research.

By 1935, at the time of the change in name, Hartford Rayon Corp. had a capacity of 3,500,000 lb. which figure since has been substantially increased.

New Process Co. Method Interests Trade

THE potentialities of the novel method employed by New Process Rayon Co., Gloucester City, N. J., for the production of cuprammonium yarn accounts for the sustained interest which has been displayed in this company since it was first organized in 1931, by William H. Furness as the Furness Corp. The process used, which was originally patented by Mr. Furness, makes possible the spinning, washing, drying, and twisting of rayon in a single continuous operation; the entire time of transition from dissolved cellulose to the finished yarn is 3 min.

Despite many difficulties, litigatory and otherwise, that have beset its path, the company has shown remarkable vitality and has increased its productive capacity substantially since it was first formed. Its output rose from nominal in 1931 when commercial production started, to an annual capacity of 1,000,000 lb. in 1933.

Shortly after beginning production, the company contracted to supply its entire output to Julius Kayser & Co., knit goods manufacturers, for two years. At that time the output averaged 500,000 lb. annually, of which 60% was 50 denier and 40% was 100 denier.

Furness Co. went into receivership in the spring of 1933, which marked the start of protracted difficulties, ending early in 1935 when Industrial Rayon Corp. acquired an interest in the company. A complete reorganization followed; the name was changed to New Process Rayon Co. and Paul Zens was elected president and treasurer, with Dr. Arthur Mothwurf, manager, and with Industrial represented on the directorate by D. S. Mallory, secretary and treasurer of that company.

HOW RAYON WAS LIFTED

To its present acceptance by the building of machines and equipment suited to its needs.

UPON its American birth 25 years ago rayon found, here and there, machinery suited to its peculiarities. Yes, many machines for older fibers had been refined, for one reason or another, to a point where they were prepared to receive rayon without blinking an eyelash—or at least a very heavy eyelash. But there were other machines, even many highly efficient for the older fibers, which gave rayon a hard time of it in those early days. They frayed it, they bruised it, they stretched it, and they broke it. In innumerable cases they did their damage unevenly, with the result that machine adjustments were of relatively little use and the products turned out were as dependable as sunshine on a picnic.

But the equipment builders were not slow in meeting the situation. Fortunately there had previously grown up in this country a textile-machine-building industry which, by and large, had no peer in the world and which in many departments had already exceeded in efficiency and originality the best that the older industries of Europe could afford. The result was that there soon began to appear in the American textile industry a family of new or modified machines and related equipment built specifically for handling, as well as producing, rayon.

While it is true that the progress rayon has made in these 25 astonishing years has been due in no small measure to a general improvement in mill equipment, whether or not such equipment has been built specifically for it, the dramatic story from the viewpoint of rayon's history and probably from that of its future lies in the way equipment builders have met the specific challenge of rayon. It is our purpose here to tell that story.

That is, it is our purpose to tell the story to date. The next instalment, to be published 25 years from now, will, we have no doubt, be even more extensive, more impressive, more astounding. It will be mainly the story of rayon staple.

Yarn Spinning Equipment

THE advances which American manufacturers have made in the production of synthetic yarns during the last 25 years are outlined by Dr. H. D. W. Smith in an article elsewhere in this issue. Much of this progress in the direction of increased production, better quality, and lower costs is traceable directly to improvements in equipment used in the manufacture of rayon. In this country, particularly, the yarn producers themselves have been active in the design and improvement of machines used in the rayon plant and details regarding a large part of that equipment have never been made public. On the other hand, many of the developments are due to the efforts of machinery manufacturers who have cooperated wholeheartedly with the rayon producers.

Before we outline briefly the contributions of some of these machinery builders, it is of interest to note that while the spinning machinery first used in this country was of foreign origin or based on models of European make, there has been a constant and growing trend toward the use of equipment designed and built in this country to meet the specific requirements of American rayon producers.

Max Ams Chemical Engineering Co

A pioneer in the manufacture of rayon spinning machines, Max Ams Chemical Engineering Corp., Bridgeport, Conn., entered this field with the introduction in 1926 of a parallel spool spinning machine combined with a rotary vacuum washer. With this machine, the yarn was wound on a perforated aluminum lacquered spool, and conveyed to the vacuum washer for removal of the acid. On 150-denier yarn, spinning speeds were about 48 or 50 meters per minute. Many important improvements were made over a period of years, and in 1931 a new model was introduced which permitted use of 125-mm. spools; gave an undulated wind to the yarn, allowing quicker washing and faster twisting; incorporated an improved compensator to produce rayon of a uniform denier throughout the spool and an automatic device to eliminate hand doffing; and had a spinning speed in excess of 100 meters per minute.

Early in 1933 J. J. Krehbiel Co., Inc., New York, was appointed exclusive agent for the sales of Max Ams rayon machinery. At the present time Krehbiel is doing considerable work in the development of staple fiber machinery and in the development of units for the continuous manufacture of alkali cellulose. The staple-fiber equipment now available includes a spinning machine, a cutting machine which operates in conjunction with the spinning machine, and an aftertreating machine.

Whitin Machine Works

Prior to 1929 Whitin Machine Works, Whitinsville, Mass., had restricted its activities in the field of rayon equipment to the building of machines on specification from yarn producers. In that year the Whitin-Kohorn Co., Inc., was formed to manufacture machinery under the Kohorn patents and to make special machines for individual rayon companies. Since then Whitin has expanded and improved its lines for both viscose and acetate processes. The first type of machine, which was introduced soon after the production of rayon started in this country, was a special spool twister for viscose yarn. Equipment now made comprises pot and spool spinning machines for viscose, a cap spinning machine for acetate, staple rayon spinning and cutting machines, and down-stroke and up-stroke twisters.

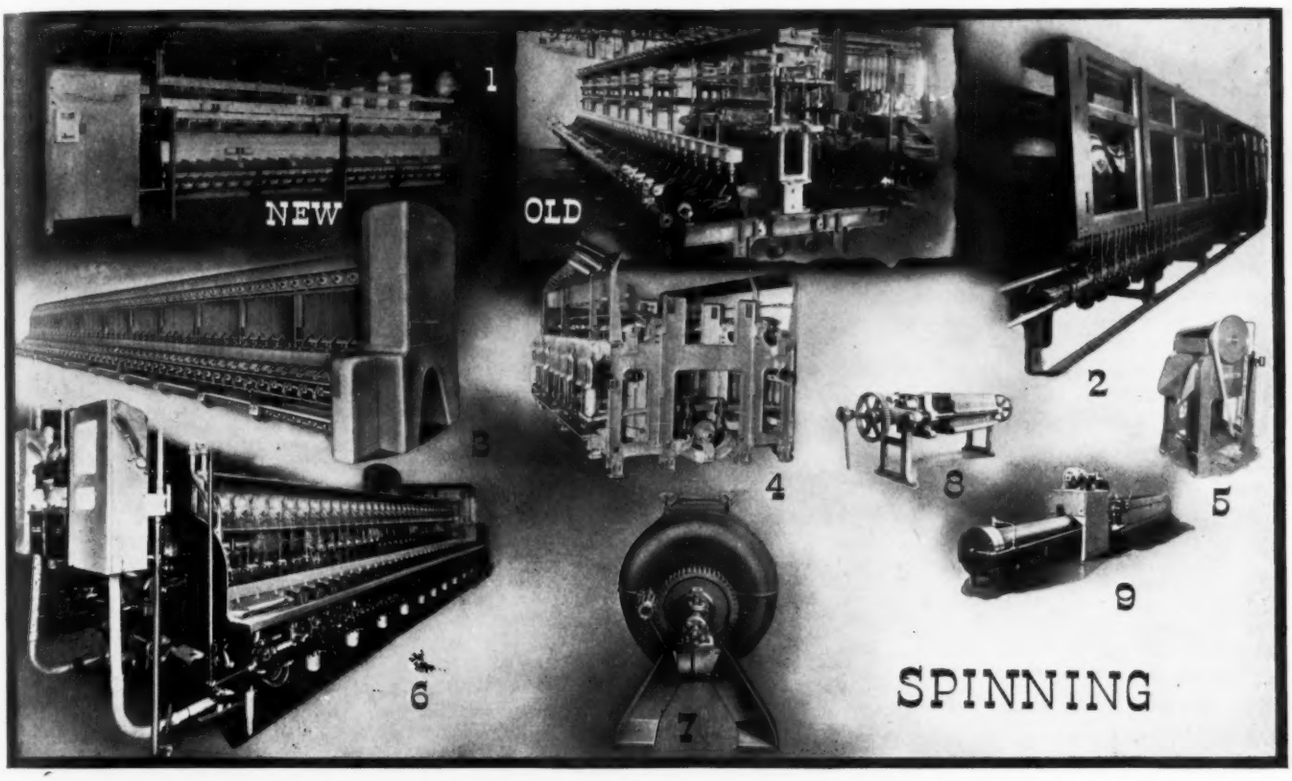
Improvements made in the spinning machines since the original models were introduced have been in the direction of higher speeds, larger packages, and mechanical refinements to reduce denier variation.

The staple rayon spinning equipment is so designed that the yarn, after being spun, can be cut by the usual methods. The same machine can also be used for the manufacture of staple rayon by the Perlock system in which a continuous band of filament, after being spun and purified, is drawn down to the proper size of roving on a breaking-down machine and then goes to a long-draft spinning machine.

The staple-cutting machine was originally designed to cut staple from 1 to 3 in. in length. Later it was found that by using rubber squeeze rolls in place of customary fluted steel rolls, wet staple could be cut in lengths up to 8 in. Therefore, the machine is now made with rolls interchangeable for wet and dry work. Production with a two-blade cutter at 120 r.p.m. is from 250 to 300 lb. per hour, with the four-blade cutter giving practically double that output on staples not exceeding 4 in.

H. W. Butterworth & Sons Co.

Manufacturers of textile finishing equipment for more than a century, H. W. Butterworth & Sons Co., Philadelphia, entered the rayon field in 1930 with a pot-spinning machine which was said to have



1. First model of pot spinning machine built by Max Ams Chemical Engineering Corp., and late model Max Ams bobbin spinning machine with automatic doffing mechanism. 2. Krehbiel staple-fiber spinning machine. 3. Whitin pot spinning machine for viscose. 4. Whitin cap spinning machine for acetate. 5. Whitin staple rayon cutting machine. 6. Butterworth pot spinning machine with fast traverse. 7. Butterworth xanthater. 8. Sperry filter press designed for use in manufacture of rayon. 9. Butterworth hydraulic steeping press.

a traverse action several times faster than any previous type. This fast traverse is designed to produce an open basket wind and thus to permit easier washing, desulphuring, and bleaching of the yarn in cake form. Other features of the machine are that it is automatically lubricated and is built entirely without cams; godet wheels can be replaced or removed while the machine is in operation; godet speeds are adjustable to take care of any take-off speed from 50 to 100 meters; funnels do not require lifting out separately, as an entire section of funnels can be raised and pushed out of the way at one time; and a P.I.V. compensator permits changing from one denier to another with the use of a series of change gears.

In addition to the pot-spinning machine, Butterworth has also brought out a bobbin spinning machine, xanthater, hydraulic press, reeling machine, piston pump, and miscellaneous timing mechanisms for the control of denier.

General Electric Co.

One of the earliest spinning pots in this country was made of a cast-aluminum shell with a hard-rubber liner. These pots were normally 5 to 6 in. in diameter. As molded plastic materials came into use generally, the original pots were replaced with pots molded from wood-flour-filled phenolic material. These pots were satisfactory at 6,000 r.p.m., with a maximum diameter of 7 in., and at 7,200 r.p.m. with a diameter of 6 in. Late in 1931 work was started by the plastics department of General Electric Co., Schenectady, N. Y., on a laminated Textolite spinning pot reinforced with wire banding molded into the wall of the structure. It was found that by using a single continuous length of wire for all the bands and by carefully adjusting its tension, the elasticity of the Textolite could be made to compensate for the difference in the coefficient of expansion between the steel binding wire and the Textolite and that the bucket could be successfully molded with internal wire reinforcement. Protection of the steel wire from the acid spinning bath was achieved by first protecting the wire itself with a primary and secondary coating fully impregnated with a resin which would bond the wire firmly to the rest of the molded structure. The wire banding is so located that the drain holes can be drilled with no danger of baring the reinforcing wire.

Tests show this pot to have from 3 to 5 times the bursting strength of the non-reinforced bucket. During the last three years there is no record of one of these pots bursting in service. They have a life expectancy of somewhat more than two years and have made feasible 7,600- to 9,000-r.p.m. pot spinning with 7-in. pots.

Although some of the early installations of pot-spinning machines used gear- or belt-driven spindles, the individual motor-driven spindle came into use almost immediately with the beginning of rayon manufacture in the United States. Today, practically all pot spinning is done with individual spindle motors. In 1914 General Electric Co. built its first rayon spindle motor. This was designed to operate at 5,000 r.p.m. with a 5-in. pot. The 1935 motor is designed for 10,000 r.p.m. with a 7-in. pot. A comparison of the two shows that the motor has been increased in size and made more resistant to acid and has been provided with improved electrical characteristics. The old rating was 0.07 hp. at 90 cycles, and the present rating is 0.36 hp. at 180 cycles. The lubrication system for the ball bearings has been constantly improved, the present system using wicks and slingers similar to those for high-speed bearings on wood-working machinery. These improvements made in spindle motors and pots have been helpful in permitting higher spinning speeds and in reducing the cost of making viscose yarn.

Reversing switches for rayon spindle motors are necessary to reduce the doffing time. The connections are reversed to plug the motors to a stop from full speed. The switches manufactured by General Electric Co. for this purpose are oil immersed and are resistant to corrosion from acid. Originally approximately 50 motors were controlled from one switch (gang doffing) but more recently rayon manufacturers are doffing in groups of 3 or 5 spindles each.

Westinghouse Electric & Mfg. Co.

The first laminated-fabric-base spinning pot originated by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., was designed for a speed of 3,500 r.p.m.; the latest model Micarta pot can be operated at speeds up to 10,000 r.p.m. This in a sentence sums up the remarkable improvements made in recent years in spinning-pot design. The latest development is an all-cord pot containing five integrally molded steel bands, the individual bands being located between the drainage holes with sufficient clearance to the holes to avoid any possible exposure of the wires at these holes. The wire bands, which are embedded to a depth of approximately $\frac{1}{8}$ in. from the exterior surface, are thoroughly sealed from direct contact with the acid. As the bucket ages in service and the strength of the wall material is depreciated, the band-

ing assumes a greater share of the load, although it is doubtful whether at any stage it is called upon to carry the full load of the bucket, even though it is so designed.

At the present time pot-spinning speeds of around 8,000 r.p.m. are in use on most installations. Still higher speeds are contemplated, and motors are tested commercially at 10,000 r.p.m. to determine acceptability. Pot-spinning is practically continuous—24 hr. per day, 7 days per week, the machine being stopped only about 1 min. every 4 to 6 hr., to remove one cake and start another. In total number of revolutions there is no parallel in industry to this application. New buckets are carefully balanced; but after several months of use considerable unbalance must be anticipated. The first problem in designing a spinning motor is one of dynamics—handling of the unbalance with minimum bearing loading; equally important is the problem of lubrication; choice of special materials to resist corrosion is still another of the many problems.

Working in close cooperation with the rayon producers, Westinghouse has devoted a great deal of effort to the development of a suitable drive for spinning pots. The earlier motors were complicated and intricate and hard to repair. Records made several years ago with motors driving 6-in. pots at 6,000 r.p.m. show failures in some cases as high as 1% per day. In recent years motors have been steadily improved in design and construction. The latest model, for example, has a special shaft and counterweight which reduce bearing loads to a minimum and allow large unbalances to be handled without appreciable shock to the motor parts. This motor is provided with two sleeve guide bearings and a miniature Kingsburg type thrust bearing consisting of two pivoted shoes spring supported to dive the load and to absorb the shock of dropping the bucket into position. The hollow shaft acts as a centrifugal pump drawing oil in through the hole in the bottom of the thrust runner and forcing it outward under pressure into the space in the bearing tube between the guide bearings. Oil overflowing at the top returns to the main chamber.

In spinning plants, pots occasionally explode in the compartments. Unless the portion remaining on the spindle is reasonably symmetrical a bent spindle results. The new motor has a removable spindle to make possible a replacement on the frame. An added advantage of this construction is the fact that any major change in bucket proportions necessitating a change of spindle flexibility can be taken care of without dismantling the motor.

In addition to the motor just described there has been developed a special form of motor suitable for unbalances of 175 gram inches at speeds as high as 8,000 r.p.m. This motor is provided with an integral fan cooling system which makes possible starting and stopping electrically as often as 40 times an hour. Experimentally it has been found possible to apply twists up to twenty per inch to dry yarns. All experiments were conducted at 12,000 r.p.m. in pots of 8 in. outside diameter. The deep pot which the construction permits makes possible a large package and the method of feeding the yarn from the center inflicts minimum damage to the fibers. While the process may not find general use, it would seem to be applicable to certain special materials where quality and continuity are of importance.

Baker Perkins Co.

The first shredders employed in this country for the conversion of alkali-cellulose sheets into crumb form for xanthating were of the same type as were used in the paper industry. Baker Perkins Co., New York, installed such equipment in the Marcus Hook plant of the Viscose Co. Later an improved shredder was developed which cuts shredding time from 3 hr. per 200 lb. batch to 1 hr. This is made possible by use of a new type of blade and complete jacketing of the machine to give the larger cooling area necessitated by the faster shredding action.

In 1926 Baker Perkins brought out the Vissolver, a machine for dissolving the cellulose xanthate. Subsequently this machine was simplified and improved in design and construction. The present machine consists essentially of a jacketed tank in which is a draught tube to induce positive circulation of the solution. At the bottom of the draught is a flared and perforated cutting screen, within which is an impeller of large diameter. This machine has reduced the dissolving time to 2 to 3 hr. as compared to the 6 to 10 hr. required up to 10 years ago.

About 3 years ago this company developed a xanthate drum suitable for operation under a 28-in. vacuum, and still more recently has introduced a combined xanthater and dissolver, which permits xanthating and dissolving to be carried out without transfer of the batch from one piece of equipment to another.

Wicaco Screw & Machine Works

Known from the early days of the American rayon industry as a manufacturer of spinning pumps, Wicaco Screw & Machine Works, Philadelphia, expanded its line over a period of years until it was producing a large variety of equipment used in the production of synthetic yarns. In 1928, for example, this company brought out a complete spinning machine of the pot type. A feature of this machine was that an individual motor was provided for each spindle, permitting the operator to stop one pot without interrupting the production of the others. All other movements, however, were operated by a single-end drive to give positive synchronization of all movements. With this machine was used the improved Wicaco spinning pump which had been announced the previous year and which was designed to produce filaments of a predetermined uniform denier and to give simplicity of operation and maintenance.

Another Wicaco development is a pot testing and balancing machine for removing the guesswork from balancing spinning pots to prevent vibration at the high operating speeds required. Recently this company has introduced an improved gear-type spinning pump constructed of alloy steel to reduce corrosion and abrasion, having the surfaces ground and lapped to high accuracy, and with the torque carried on the outside hub to prevent wear of shafting bearings.

J. Bishop & Co. Platinum Works

Antedating commercial production of rayon in this country were various experimental efforts to produce synthetic yarns. It was in those "prehistoric" days—1909 to be exact—that J. Bishop & Co. Platinum Works, Malvern, Pa., first started to manufacture platinum spinnerets. Glass and, to some extent, nickel had been used previously; but these materials were not satisfactory for the viscose process. The next step, following the introduction of platinum spinnerets, was the development of alloys having greater hardness and longer life; typical of the alloys now employed is one containing 70% gold and 30% platinum. The next important improvement made by Bishop was the hyperbolic hole, which improved the spinning quality of the spinneret and reduced jet changes. One of the most recent developments is the manufacture of spinnerets having many more holes per jet and holes of much smaller diameter than were originally produced, thus making possible the production of multi-filament yarns.

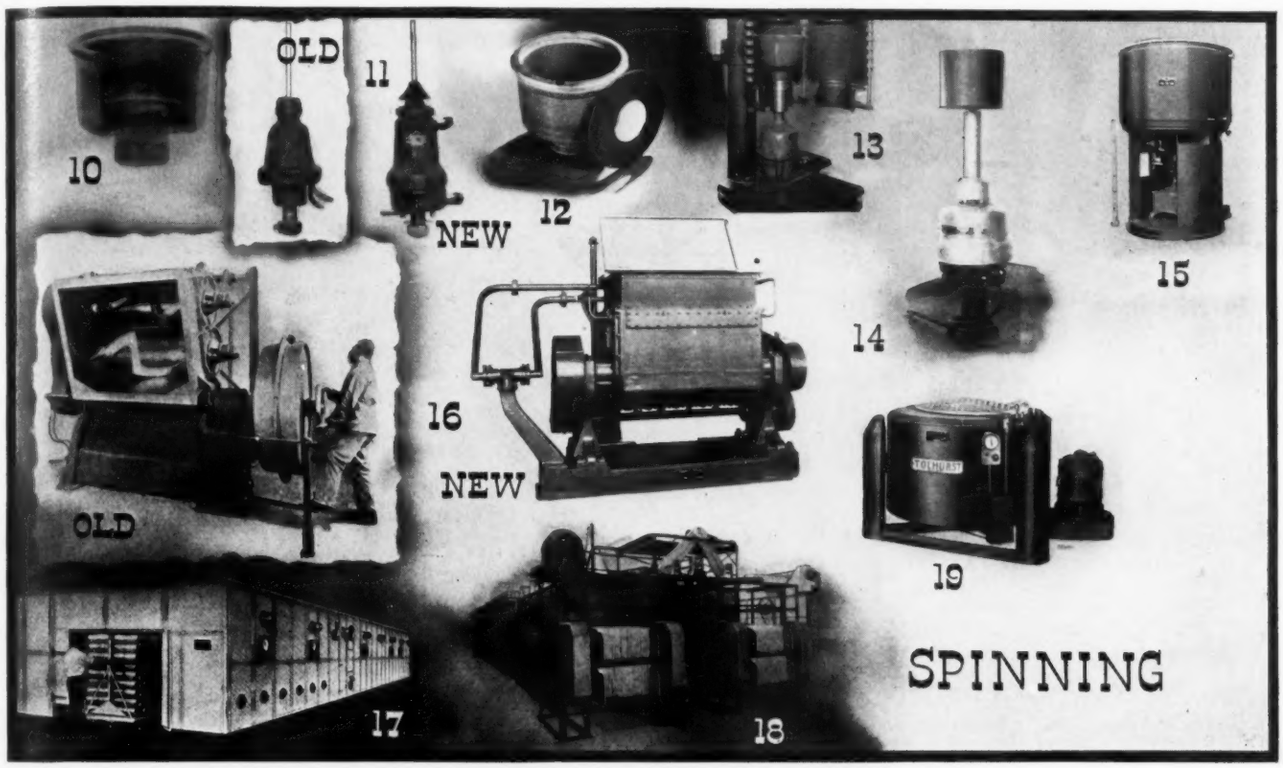
Baker & Co.

When Baker & Co., Newark, N. J., first went into the manufacture of spinnerets in 1924, the making of these devices was still in the experimental stage. Probably no single piece of equipment used in any industry and produced in quantity can compare with the spinneret in microscopic accuracy. Uniformity of hole sizes and shapes is essential, and the holes must be free from burrs or scratches, tolerances must be within ± 0.0001 in. Precious-metal alloys of more and more homogeneous crystalline structure have been formulated which take better and better finishes. With these harder alloys, it has been possible to achieve an improvement in the tooling of the holes. In order to insure uniformity of hole sizes and shapes, this company developed an inspecting and measuring apparatus which permits the detection of difference in hole size of 0.00004 in. Compared with the first spinnerets produced, those made today last longer and produce more rayon with less waste. The search still continues, however, for even better alloys and a closer approach to perfection in the holes themselves.

American Machine & Metals Mfg. Corp.

In the production of rayon yarn, hydroextractors find their chief applications in removing oil after the oiling operation and for dehydrating the yarn after washing. In the early days of the industry, centrifuging was usually carried out while the rayon was in skein form; today extracting often takes place after the yarn has been wound in package form.

Tolhurst Division, of American Machine & Metals Mfg. Corp., New York, has been active from the start in the development of centrifugals to meet the needs of the rayon producers. At first it supplied two types of centrifugals—the self-balancing type, and a newly developed type called the center slung. The self-balancing was an over-driven machine which had received its first use in the laundry industry; the center slung was an early under-driven, open-top machine with direct motor drive which necessitated having a pit directly underneath to accommodate the motor. Later this company brought out an improved center-slung type with vertical motor drive through V belts. Practically all the machines are now constructed of Monel metal throughout. Automatic timers regulate the length of the spinning period, so that only the exact amount of liquid desired is thrown off. Removable baskets are supplied in many cases to increase the capacity of the machine. In addition to this model, Tolhurst has made a number



10. General Electric spinning pot made of laminated Textolite reinforced with wire banding. 11. Early model of General Electric spindle motor introduced in 1914 and designed to operate at 5,000 r.p.m. with a 5-in. pot, and latest model of General Electric spindle motor designed to operate at 10,000 r.p.m. with a 7-in. pot. 12. Westinghouse high-speed Micarta spinning pot with embedded steel reinforcement. 13. Westinghouse spinning motor set up for test at 10,000 r.p.m. 14. Special Westinghouse spinning motor suitable for starting and stopping up to 40 times an hour. 15. Baker Perkins Vissolver for dissolving cellulose xanthate. 16. Shredder made 25 years ago by Baker Perkins and new duplex Baker Perkins shredder. 17. Proctor & Schwartz truck dryer for preliminary drying and conditioning of yarn on cylinders. 18. Automatic skein drying and conditioning machine developed by Philadelphia Drying Machinery Co. 19. Tolhurst center-slung centrifugal with vertical motor drive.

of special centrifugals to meet the requirements of individual rayon producers and has also brought out equipment for use in the rayon dyeing industry.

Proctor & Schwartz

From the inception of the American rayon industry, Proctor & Schwartz, Philadelphia, has been actively engaged in the production of drying equipment for yarns and piece goods. When Viscose Co. built its plant at Marcus Hook, in 1910, a Proctor machine was installed for the final drying and conditioning of the yarn in skeins.

The same type of dryers, although of later and more advanced types, are still in use at the Marcus Hook plant. These present-day machines embody vast improvements over the early installations, and permit a far greater efficiency of operation and closer control. In these machines the skeins are carried through progressive stages of drying, cooling, and conditioning and are delivered with the desired final moisture content uniformly distributed through each skein. Each step of the process takes place in a separate compartment, within which the skeins are subjected to a constant and uniform circulation of air, and with the exact conditions required at that particular point of processing.

In addition to the final dryer and conditioner for skeins, Proctor & Schwartz has developed a progressive truck-type used for drying and conditioning rayon on cylinders, in cake form, or in skeins on stretcher trucks. A machine of this type takes the rayon through drying, cooling, regain, and conditioning, and delivers it with the desired degree of moisture evenly distributed. This necessitates correct application and control of air circulation, as well as the accurate control of wet- and dry-bulb temperatures, through the successive operations.

Philadelphia Drying Machinery Co.

The first dryers built by Philadelphia Drying Machinery Co., Philadelphia, for rayon manufacturers in 1918 were final dryers for drying skein rayon after processing. The type of dryer worked out to meet these early requirements was a four-conveyor machine, carrying the skeins on poles about 4 ft. long. Particular attention was given in designing a machine with a minimum possibility of mechanical breakage or chafing of the delicate filaments, and air velocities were rather low to avoid whipping of the yarn. Automatic temperature control was considered essential to good drying, and the control-instrument manufacturers worked closely with the rayon producers and the builders of drying equipment.

Conditioning of the dried yarn was accomplished in these dryers by introducing humid air from the building air-conditioning equipment into the dryer, near the discharge end. This system was soon replaced by the present system, using a cooling compartment after drying, followed by conditioning, using humid air generated by humidification apparatus built as an integral part of the dryer.

This general type of machine is still used today. There have been many refinements of design, permitting the use of higher air circulation velocities and consequent increased production. Longer poles are now used with heavier loadings, to reduce the operating labor. More accurate controls are now available, and the whole drying process is now on a more definite, scientifically controlled basis. In recent years, the trend towards larger and larger skeins and the use of finer deniers have given rise to new problems requiring even more careful regulation of air-flow conditions.

In the field of preliminary drying, two processes were developed, one for drying pot-spun cakes, or bobbins; the other, for drying skeins stretched under considerable tension. Both were carried out in tunnel-truck machines of the progressive type. The problems involved were similar to those encountered in final drying; but the limitations as to air velocities and chafing were not present to the same extent. Particular attention was paid to uniformity of temperature and accuracy of control in both drying and conditioning.

The stretched-skein process of preliminary drying has largely been replaced by cake drying or by the more modern processes requiring only one drying. Much of the present rayon production is being handled by these new single-drying processes, in which all processing is done in the cake, bobbin, or skein, and the material delivered from the dryer is essentially finished material.

The present trends in dryer construction and operation are toward utilization of better materials of construction, such as aluminum to eliminate the hazards of metallic contamination of the yarn, and towards control of the properties (particularly shrinkage) of the yarn, by care-

ful control of both temperature and humidity throughout the entire drying operation.

Other Equipment

In addition to the equipment already described there are various other machines and devices the development and improvement of which have contributed to the growth of the rayon industry. Thus, introduction several years ago of a steeping press by Hydraulic Press Mfg. Co., Mount Gilead, Ohio, permitted steeping and pressing of the cellulose sheets to be carried out in one piece of equipment. Filter-press manufacturers, including T. Shriver & Co., Harrison, N. J., and D. R. Sperry Co., Batavia, Ill., have cooperated with rayon producers in the development of presses suitable for filtering the viscose solution before spinning. Turbo Mixer Corp., New York, has brought out an improved viscose mixer; and Sharples Specialty Co., Philadelphia, a centrifuge for clarifying viscose solutions. Improvements in dialysers for caustic soda recovery, introduced in 1930, by Race Co., New York, give double capacity, longer life, and higher purity of caustic.

With the exception of the spinneret no part of the spinning equipment is built to meet as rigid specifications as are spinning pumps. Schutte & Koerting Co., Philadelphia, and Zenith Products Co., Newton, Mass., have specialized in the manufacture of these pumps and from time to time have made numerous improvement of evaporators and various developments is the use of new steel-alloys which withstand better the abrasive action of the titanium dioxide present in the pigmented type of rayon yarns. In 1925, Macbeth Evans Glass Co., Charleroi, Pa., started production of glass godet wheels and this type of wheel is now widely used in pot spinning of viscose. Without going into details, mention should be made of the fact that the development and improvement of evaporators and various other equipment used for the recovery of chemicals used in rayon manufacture have been instrumental in reducing production costs of the synthetic yarns.

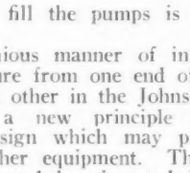
Soaking Equipment

WHEN rayon enters the soaking bath, it is not protected by a natural gum; hence it is more susceptible than silk to damage by tangling. Furthermore, rayon has a tendency to swell appreciably in the process; and, if it is bundled too tightly, it will resist adequate penetration of the liquor. For these reasons the silk-soaking machines have not been adopted for rayon. However, the old silk-soaking tubs have proved suitable; and, since rayon can be treated quite rapidly by this means, no one—until recently—has been concerned with the possibility of speeding up the process by the development of special machinery.

Johnson Engineering & Mfg. Co.

But this year the Johnson Engineering & Mfg. Co., Wilkes-Barre, Pa., has announced a soaking or tinting machine capable of treating rayon in about 4 min., as against the 20 or 30 min. formerly required. In this machine the skeins are hung over porcelain arms which revolve slowly, and they are sprayed with soaking solution issuing from perforated pipes located just below the porcelain arms and consequently inside the skeins. Sufficient solution to fill the pumps is all that is required.

An ingenious manner of insuring uniform pressure from one end of the spray pipes to the other in the Johnson machine establishes a new principle in textile-machine design which may prove applicable to other equipment. This involves a tapered metal bar inserted in the pipe to constrict its capacity to a progressively greater extent where the flow of water through the perforations would otherwise be increasingly greater.



Throwing Progress

RAYON has made its greatest progress during the crepe era in textiles; and this means that it has, in common with silk, demanded accuracy of twist and uniformity of yarn tension in throwing machinery. In view of the fact, however, that silk crepe antedated rayon crepe and dominated the field through the first part of the era, rayon cannot take credit directly for all the extensive improvement which has been made in throwing machines—an improvement which would require more than the limits of this article to record.

But it must take credit for some of it. Rayon is, generally speaking, a coarser material than silk. Therefore, heavier packages are necessary in order to hold a practical length of yarn, and the larger packages necessitate heavier machines and greater spacings between spindles. Rayon has also demanded greater cleanliness and freedom from oil stains, since oil is more difficult to remove from rayon than from silk.

Atwood Machine Co.

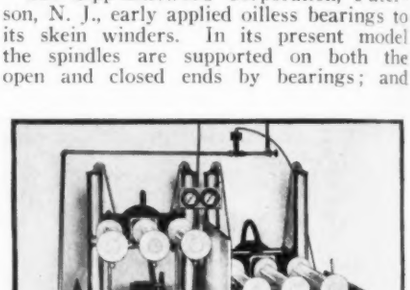
The Atwood Machine Co., Stonington, Conn., had built throwing machines in the days of the Connecticut mulberry orchards, and its machines naturally had the honor of handling some of the first rayon processed in this country. (In fact, there were Atwood doublers in the plant opened by Viscose in 1911.)

For a considerable period Atwood succeeded in accommodating rayon by minor improvements which could be applied to existing machines, but in 1930 they had accumulated to such an extent and there were so many new ideas awaiting an opportunity for expression that the company's engineers found it necessary to change the construction features completely. One of the new models was the Monarch twister, which was protected against grease leakage. Shortly thereafter this machine was equipped with oilless bearings, which protected the yarn against stains, saved the cost of oil and of oiling, and made for more continuous production. The Stonington winder, which was announced in the same year, had advantages over earlier models in that it was oilless, had larger cams to give evener bobbins, and had greater clearances. Today oilless bearings are standard throughout Atwood equipment.

In recent years this company has made a special effort to pave the way for the use of larger packages throughout the throwing industry, thus reducing the handling and the number of knots.

Sipp-Eastwood Corp.

The Sipp-Eastwood Corporation, Paterson, N. J., early applied oilless bearings to its skein winders. In its present model the spindles are supported on both the open and closed ends by bearings; and



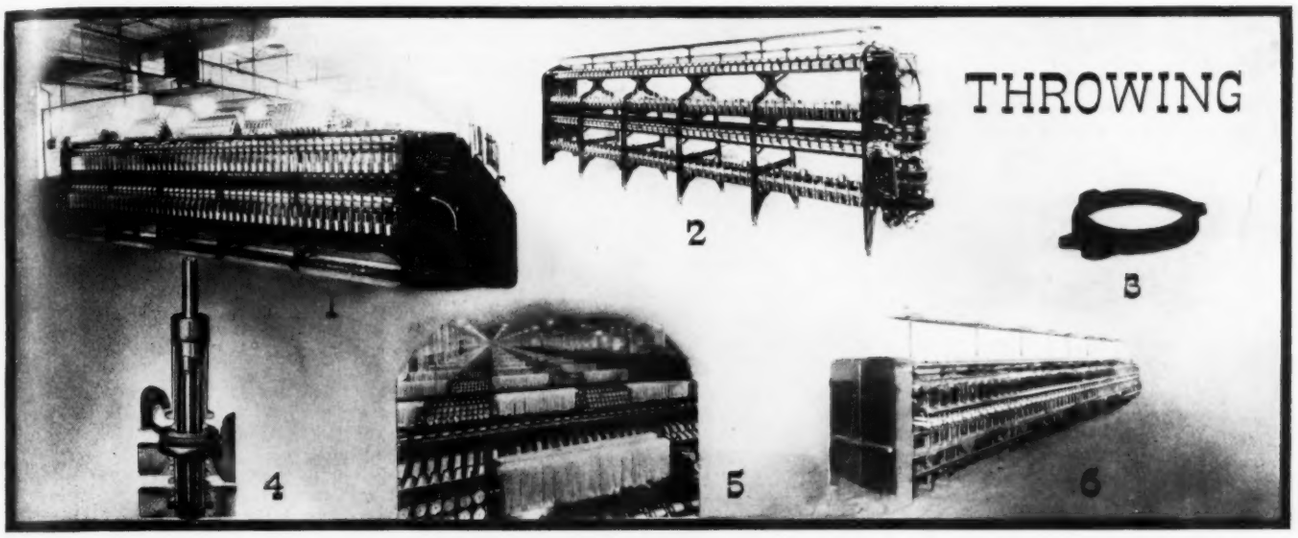
Johnson Engineering's soaking machine

when wear takes place, fresh surface may be put into play by turning the bearings in the brackets. One of the latest improvements is a traverse motion designed to eliminate jar and vibration and insure rigidity at high speeds. (There were Sipp machines operating at the Viscose plant in 1911.)

Fletcher Works

Fletcher Works, Philadelphia, entered the throwing-machinery industry in 1928 as the result of its purchase of the Scranton Silk Machine Co.

The principal improvement specifically for the benefit of rayon for which Fletcher was responsible was the invention of a twister spindle that would satisfactorily stand up under the exacting service imposed by the larger and heavier packages of rayon yarn. The improvement consisted of giving the spindle a longer bearing surface, arranging that the surface would be lubricated in a manner that would insure sufficient oil film at all times and would retain the original lubricating qualities of the oil, and protecting the bearing against outside contamination. The result was the so-called "oilwell" spindle, which has an oil reservoir capable



1. U. S. Textile's "Acme" twister. 2. Atwood's "Monarch" twister. 3. Whitinsville's self-lubricated ring. 4. Fletcher's "Oilwell" spindle. 5. Installation of Sipp-Eastwood winders. 6. Whitins downstroke ring twister.

of holding a supply of permanently clean oil sufficient for a year's constant operation. The oil is fed consistently to the bearings, affording proper lubrication without any pump action. During spindle operations, the oil in direct contact with the blade is gradually replaced with fresh, cool oil, below the temperature which would set up a chemical reaction. This prevents carbonization and the formation of the so-called black or dirty oil. The spindle is applicable to both ring and up-stroke twisters.

U. S. Textile Machine Co.

The United States Textile Machine Co., Scranton, Pa., built its first rayon machinery in 1929. Its Acme upstroke twister is designed for cleanliness, rigidity, smooth operation, and accurate twist. End frames are of the closed type. The machine is liberally equipped with ball bearings and practically free from oil and dirt contamination. It has a cut-cam traverse motion. The Acme winder, developed shortly afterward, is of equivalent quality.

Whitin Machine Works

Another upstroke twister is built by Whitin Machine Works, Whitinsville, Mass.; but this is primarily for the rayon producer, rather than the throwster. To avoid the danger of oil stains, oilless bearings are employed on the take-up rolls. Milled cams and differential gearings are inclosed and operate in an oil bath, insuring smooth running and long wear. The traverse may be adjusted to build square, round, or taper-end bobbins. The spindles, which are of the gravity type, have extra large oil cases, and each spindle is equipped with a hand brake. Instead of the endless belt employed on twisters of this type, a 4-spindle tape drive is used. One cam controls all four lines of traverse guides. One twist gear controls the speed of the four lines of rollers, and therefore changes are made simply.

Whitin also builds twisters of the ring type for twisting rayon in single and ply yarns with turns per inch ranging from 2½ to 65. On these machines the yarn may be twisted either wet or dry and oil may be applied to the rayon by means of a variable-speed roll. The spindles employed are of the gravity type, with effective knee brakes and large capacity bolsters. Stainless steel is used for all guides, and the feed rolls may be either of stainless steel or chromium plate. Rings can be of the regular type or can be equipped with greased grooves or with automatic lubrication.

Whitinsville Spinning Ring Co.

The type of twisting rings used for rayon previous to 1930 included the ordinary flange type common to cotton spinning and the familiar hand-greased plain vertical type. In that year the Whitinsville Spinning Ring Co., Whitinsville, Mass., licensed under the Eadie patents, introduced to the American rayon industry a new "diamond-finish" twisting ring incorporating a lubricating wick which passes around the entire circumference. The purpose is to decrease ring wear; eliminate the dirtiness, labor cost, and production loss due to hand greasing; and secure a 50% gain in traveler speed.

The accompanying illustration shows a rayon ring in a holder which fits into the place of the usual plate holder without alterations. The oil reservoir is cast integral with the holder. The wick is laced through the ring around the entire circumference, its ends terminating in the oil reservoir. This wick keeps the oil grooves provided with a supply of lubricant which is unaffected by heat or cold. As a result, the traveler is completely lubricated without danger of oil spray.

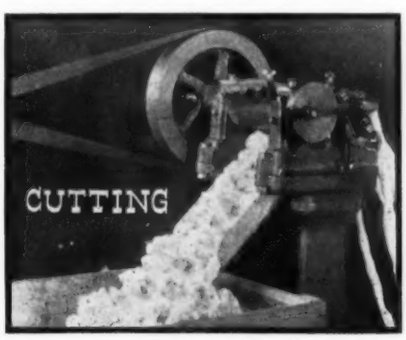
Saco-Lowell Shops

Saco-Lowell Shops, Boston, Mass., began building twisters for use on rayon in 1924, but these were strictly of the ring type and differed little from the cotton twisters the company had previously built. Today Saco-Lowell features custom-built twisters, constructed to meet the needs of the purchasers. Rolls, creels, and tensions are designed to give proper control of denier. For some time the company has had under development an interesting innovation in rayon twisters, embodying a combination of the upstroke and downstroke principles.

Staple and Waste

RAYON staple today has little equipment it can call its own, so far as the textile industry proper is concerned. This is perhaps surprising when one considers that its use is expanding rapidly and that it is destined to become, howbeit in a more developed form, the dominant textile raw material. Whitin, however, offers something of a new system of yarn manufacture in its Perlok method, which breaks down a band of continuous filament by a drafting process.

In a sense, rayon staple is an outgrowth of rayon waste, but even for waste few machines were devised to meet new and special needs. One of the few, however, was of importance to the adoption of this filament-rayon off-shoot as a raw material. We refer to the rotary cutter developed by F. J. Stokes Machine Co., Philadelphia, and illustrated herewith.

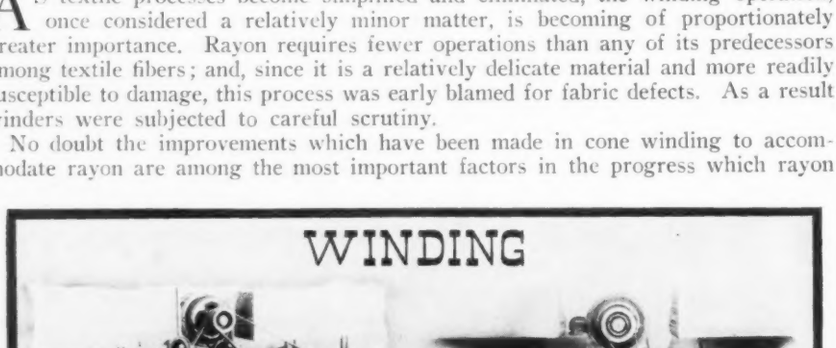


At left—Stokes' rotary fiber cutter

Changes in Winding

AS textile processes become simplified and eliminated, the winding operation, once considered a relatively minor matter, is becoming of proportionately greater importance. Rayon requires fewer operations than any of its predecessors among textile fibers; and, since it is a relatively delicate material and more readily susceptible to damage, this process was early blamed for fabric defects. As a result winders were subjected to careful scrutiny.

No doubt the improvements which have been made in cone winding to accommodate rayon are among the most important factors in the progress which rayon



1. Universal's old No. 50 winder and Universal's new No. 50 winder. 2. Foster's Model 75 equipped for conditioning. 3. Foster's Model 75A with right front drive.

has made since it was first produced in America. Certainly it was the development of a properly wound package that made satisfactory rayon knitting possible—rather than any important advance in the knitting machines themselves. Also, it was a suitably wound cone which was originally responsible for the adoption in rayon manufacture of the over-end principle of warping, with its alleviation of the yarn-tension problem and the elimination of much warp-streakiness in fabrics.

Originally, when rayon was put up in cone form, it was wound onto the same type of cone as silk—that is, a cone with 5 in. traverse and 5° 57′ taper. The winding spindles were driven by clutch, the gainer mechanism was driven by belts, and most rayon for knitting yarn was treated with an emulsion while in skein form.

Universal Winding Co.

One of the first advancements in rayon-winding equipment pioneered by Universal Winding Co., Boston, Mass., was an attachment for the No. 50 which made possible passing the yarn over an emulsion roll. This is a corrosion-resisting roll, partially submerged in the emulsion trough and revolved slowly in the opposite direction to the travel of the yarn. The speed of the roll controls the moisture content. By a gradual change in the position of the guide, the angle at which the yarn crosses the roll increases as the cone builds up and compensates for the increased speed of the yarn. This assures uniform conditioning from start to finish of the winding.

The next improvements for the Leesona winder were the "Antiwear" tension and "Quixset" slub catcher. The former is so constructed that wear is distributed over a wide surface and the life of the tension is considerably multiplied. The tension assembly is positioned parallel to the spindle to permit the yarn to traverse between the tension fingers and jaws of the slub catcher in unison with the traverse guide as the yarn is carried from one end of the cone to the other.

The Quixset slub catcher is a part of the Antiwear tension assembly. It consists of a hardened steel rod and blade accurately fixed in correct relation to the tensions. The lower edge of the carefully ground slubbing blade is positioned opposite the center line of the steel rod, leaving no wedge-shaped opening for soft bunches to squeeze through. Adjustment for varying diameters is accomplished by a slight turning of the steel rod, which is eccentric on the side opposite the slubbing blade. This adjustment is held firmly by a strong spring clamp and cannot be altered except with a specially designed wrench.

The next development in winding was the "Jumbo" cone, but it was soon rendered obsolete by the adoption of the 3° 30′ taper. Following this came the replacement of the belt gain mechanism (with its split gainer pulley ring and short endless driving belt) by the gear gain attachment. This consists of a train of gears running from the spindle to the camshaft. These gears are enclosed in an oil-tight case with a reservoir at the bottom. Unlike the belt gain mechanism, it requires no adjusting or resetting and, in fact, needs no attention except the addition of a little oil to the case from time to time. The gear gain also insures uniformity of the cones on every spindle, because there is a constant and definite ratio of speed maintained between the spindle and the camshaft.

As time went on, it became necessary to meet a demand for heavier packages with longer traverses and larger diameters. This was done without great difficulty.

Straight-belt drive was welcomed, particularly by those mills which were at the time winding directly from skeins. Known originally as L-drive, it gives the operator better control while starting. It makes possible a slow start, without jerking, and prevents fracturing the filaments, thus reducing end breakage. In addition to eliminating clutches and the trouble and cost of their maintenance, straight-belt drive provides the advantage of a single belt in a straight line for all twelve spindles, instead of one belt for six spindles on serpentine drive. This increases belt life. Of course, spindle wear is considerably reduced by replacing serpentine drive, and extra end idler pulleys remove strain from the end spindles. Eleven spindles can be operated while one is stopped for repairs. Larger spindle pulleys allow a larger motor pulley and hence a more efficient contact. In addition, the machines can be laid out in a straight line, instead of being staggered as with clutch-driven machines.

A later development is a taper-end attachment, particularly for parallel tubing. It makes it unnecessary for the mill to carry a large investment in spools for shipping yarn in small packages to weaving plants and saves on shipping costs and breakage.

Another development by the Universal Winding Co. for the rayon trade is the special No. 30 winder, which has the working parts of all spindles completely enclosed. This is an eight-spindle gang design.

Foster Machine Co.

The Foster Machine Co., Westfield, Mass., entered the field of specialized rayon machinery in 1926. It had found cone winders for such yarns as cotton and worsted unsuited to handling rayon, and therefore it developed a precision-wind machine that would meet the fussy requirements of the new material.

Since the delicate nature of synthetic fiber required more tender handling in the winding operation to avoid straining and breaking of the fibers, a slow-starting arrangement was developed, which, however, allowed high winding speed after the inertia of the package to be started had been overcome.

Later were developed conditioning attachments with compensating parts that give the yarn the same pre-determined amount of conditioning at the full cone, where yarn speed is high, as at the small cone, where yarn speed is low. Finally came more efficient slub catching, positive gear gainage, and more flexible tension and guide pressure arrangements to build cones for knitting and cone warping of low, medium, or high density, as required.

Yarn-Package Foundations

THE development of machinery adaptable to handling rayon has been paralleled by the development of suitable yarn-package foundations, such as spools, bobbins, quills, cops, cones, and tubes. It has been found that rayon requires its own angle of taper on such foundations, that their surfaces must be smooth and soft, and that the tips of cones, for example, must be reinforced and made relatively slippery by the use of lacquer or metal. The necessity for improvement became more important as finer deniers became more common. Therefore, many of the improvements in package foundations are of relatively recent origin.

Sonoco Products Co.

In 1925, when it became evident that the taper cones commonly employed for silk yarns and cotton yarns were not giving satisfactory service for rayon, the Sonoco Products Co., Hartsville, S. C., began a series of experiments to produce a more suitable design. These experiments showed that a cone made to a 3° 30′ taper is the most satisfactory for rayon, while for silk a cone of 5° 57′ taper is desirable and for cotton, cones of 9° 36′ and 9° 15′ are most suitable.

The first 3° 30′ cone which Sonoco produced for rayon was produced exclusively for a knitting package, but when, in 1928, the magazine creel was developed to handle rayon from a paper cone, this shape was found suitable. Cones for this creel, however, required a surface of such finish that the rayon would run off the cone without hanging or breaking and would transfer satisfactorily to the next cone. Yet the surface had to be such that there must be no slippage in the primary winding. To meet this development, Sonoco produced its "satin-finished, velvet-surfaced 3-30" cone which today is used not only for magazine creeling but for knitting packages as well. It has proved to be so essential in the handling of rayon that other cone manufacturers have been licensed to produce it, and today it is the foundation of 100% of the coned rayon in America.

Pairpoint Corp.

About twelve years ago, the Pairpoint Corp., New Bedford, Mass., began the manufacture of cones specifically for the rayon trade, and today its line includes lacquer-tipped, moisture-resisting cones and velvet-surfaced cones and tubes.

American Paper Tube Co.

Rayon has always been particularly susceptible to damage from filling bobbins which have been roughened by wear or chipped by being dropped or knocked about; and the crepe era has been responsible for much warping of bobbins in twist setting and conditioning. For these reasons the American Paper Tube Co., Woonsocket, R. I., brought out in 1931 an impregnated and hardened paper weaving quill. This is made with short, pressed metal ferrules for mechanical feeler motions and with long metal ferrules for electric feeler motions. It is also made with Bakelite heads for adaptation to special shuttle constructions. It is particularly notable for a smooth, hard, durable surface, on which yarn slippage is prevented by corrugations. Since the paper construction makes small diameters possible, these quills can hold large supplies of yarn. They have also shown some tendency to reduce the development of static electricity in synthetics.

Merkel Bobbin Co.

In a Bakelite-head bobbin developed a few years ago by Merkel Bobbin Co., Allentown, Pa., a paper base is used on the inside of the heads to give a glassy and durable surface, while a canvas facing on the outside adds the strength necessary to withstand jolts.

Clover Leaf Mfg. Co.

In 1934 Clover Leaf Mfg. Co., Honesdale, Pa., announced Bakelite-head throwing bobbins with differently colored laminations to facilitate yarn identification. The company has long made bobbin heads

1. Sonoco's first 3-30 cone, and Sonoco's satin-finished, velvet-surfaced 3-30. 2. Fiber-head spool built by U. S. Bobbin & Shuttle. 3. American Paper Tube's impregnated and hardened quills.

Lestershire Spool & Mfg. Co.

Lestershire Spool & Mfg. Co., Johnson City, N. Y., introduced a fiber-head spool in 1932 which employed a head-locking ring of cadmium-plated steel, giving 2% greater strength; and in 1934 it offered a further improvement in the way of a vulcanized fiber head which eliminated danger of frayed yarns. Lestershire's spool with the small head on one end has proved advantageous for rayon over-end warping.

U S Bobbin & Shuttle Co.

A special threaded construction has been applied to fiber-head spools for rayon by the U S Bobbin & Shuttle Co., Manchester, N. H.—affording strength and reducing the danger of heads loosening.

of laminated Bakelite, vulcanized fiber, brass, stainless steel, and aluminum; and it has constantly striven for greater strength, uniform quality, and balance.

H. & P. Spool & Bobbin Co.

Special finishes for rayon spools and bobbins, as well as transparent enamel finishes to withstand heavy conditioning, have been developed by H. & P. Spool & Bobbin Co., Lawrence, Mass.

Adolff Bobbin Co.

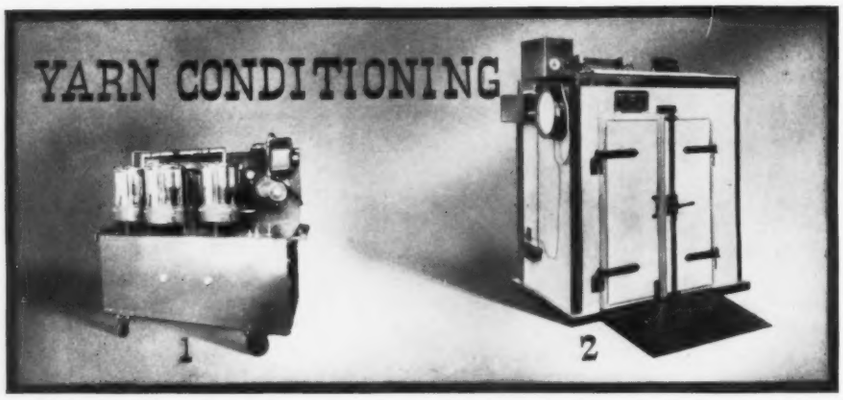
A variety of bobbins and tubes have been developed especially for rayon by Adolff Bobbin Co., Kearny, N. J. They differ considerably in construction, size, and general make-up; and many are custom built for the exclusive use of various concerns.

Yarn Conditioners

IT IS only within comparatively recent years that any specialized equipment has been developed for conditioning rayon yarns and setting the twist in rayon crepe. In addition to the electric steam box brought out in 1931, by Lydon Bros., Jersey City, N. J., primarily for setting twist in silk, but also extensively used for rayon, at present there are at least two machines available, each of which differs greatly from the other in design and construction.

Industrial Dryer Corp.

One of the difficulties encountered in the manufacture of rayon crepe fabrics is the sloughing-off of the yarn from the quills in weaving. To overcome this, Industrial Dryer Corp., Stamford, Conn., developed a rayon conditioner and twist-setter, which was introduced somewhat over a year ago. The machine is based on the same principle as the silk conditioner announced by this company in 1933, but differs from it in detail. Essentially the equipment consists of a conditioning compartment, units for



1. Hygrolit machine for conditioning rayon on cones, tubes, or bottle bobbins. 2. Conditioner and twist setter for rayon yarns developed by Industrial Dryer Corp.

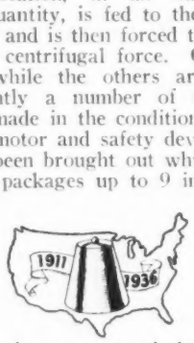
generating heat and moisture, and an automatic device for controlling and recording the temperature and humidity in the conditioner. Air passing over a constant-level water bath (heated electrically or by steam) takes up moisture in a finely diffused state; this air is then brought automatically to the desired humidity by a balancing dry unit, and then with its vapor enters the conditioning compartment.

At full capacity, the conditioner is able to handle approximately 5,000 lb. of yarn or quills in 16 hr.—12 min. of conditioning time being satisfactory for 200-denier yarn with 50 turns, and a shorter time for 150- and 100-denier. It is stated that the machine not only reduces sloughing-off, but also overcomes the liveliness and kinkiness of the yarn, thereby reducing the number of broken picks. Likewise the control of temperature, humidity, and time is said to result in a more uniform pebble. While the conditioner will set the twist in crepes as high as 80 turns and, hence, is suited to throwsters' requirements, it is designed to give any humidity between 30 and 95%, a sufficient range to permit conditioning of low-twist filling yarns without danger of shiners.

Hygrolit, Inc.

About six years ago Hygrolit, Inc., Kearny, N. J., developed a new type of equipment for conditioning yarn wound on perforated cones or tubes. With this machine, a special conditioning liquid was forced by compressed air from the inside of the package to insure uniform distribution. A dial control permitted the package to be brought to any desired humidity. This method of conditioning was applicable not only to rayon, but was suitable also for other types of yarn. In 1934 a new type of conditioner for cones, tubes, and bottle bobbins was brought out, which consists essentially of three small extractors on a table, each containing a basket shaped to hold one yarn package snugly. The conditioning solution, in an automatically measured quantity, is fed to the center of the package and is then forced through the package by centrifugal force. One basket is loaded while the others are running. More recently a number of refinements have been made in the conditioner, including a new motor and safety devices, and a model has been brought out which can accommodate packages up to 9 in. in diameter.

Warping Problems



SINCE the silk mills were the first to adopt rayon, it was natural that the first warping of the new yarn should be done on the silk system. It was natural also, therefore, that when the first cotton mills began to warp rayon they should think it necessary to adopt the silk system. But when the great revolution in warping began, with the application of the over-end idea to the cotton method, it looked for a time as though the high speed of the cotton system would make that predominant. Later, however, the application of the same principle to silk warping established something of a balance between the merits of the two systems.

Universal Winding Co.

The Universal Winding Co., Boston, Mass., was the originator of the over-end system, which involves the pulling of yarns over the end of stationary yarn packages in the creel. It had found that on cotton yarn, the new method gives a more uniform tension over all ends than do the revolving spools and that all that is required of individual tensions is enough resistance to the movement of the ends to prevent their sagging and tangling when the warper stops. The company had also been able to show cotton mills that there are advantages in the more uniformly wound and larger-capacity cones.

T. C. Entwistle Co.

But the Universal Winding Co. did not then—nor does it now—build warpers. Therefore, it conducted its original cotton experiments with the cooperation of the T. C. Entwistle Co., Lowell, Mass. Naturally Entwistle was one of the first to apply the system to rayon. This occurred some ten or twelve years ago.

Entwistle found many conditions in rayon manufacture vastly different from those in other divisions of the industry; but it eliminated the troubles and is today building an efficient rayon beam warper that can be operated at a yarn speed of 250 to 300 yd. per minute, depending on the quality and kind of yarn. An electrical stop motion eliminates the problem of lost ends, and an accurate measuring device eliminates waste at the slasher. Both over-end spool creels and magazine cone creels are employed.

This company recognized, however, that mills producing a wide variety of rayon fabrics with a relatively small production of any one of them would stay with the silk-warper system. Therefore it early endeavored to improve conditions in the latter mills by developing an electric stop motion applicable to the reel or horizontal-warper method. The drop wires of this motion are located in the creel and are equipped with porcelain eyes to resist the cutting action of the rayon. An electrically controlled lease-measuring dial automatically stops the reel when the correct length has been wound. An electrical locking device to hold the treadle board down eliminates the need for the operator to stand on the board to keep the machine in operation. This locking device is wired in conjunction with the lease dial and electrode for the drop wires, so that the treadle board is released to stop the warper whenever an end breaks or a pre-determined length of lease has been wound.

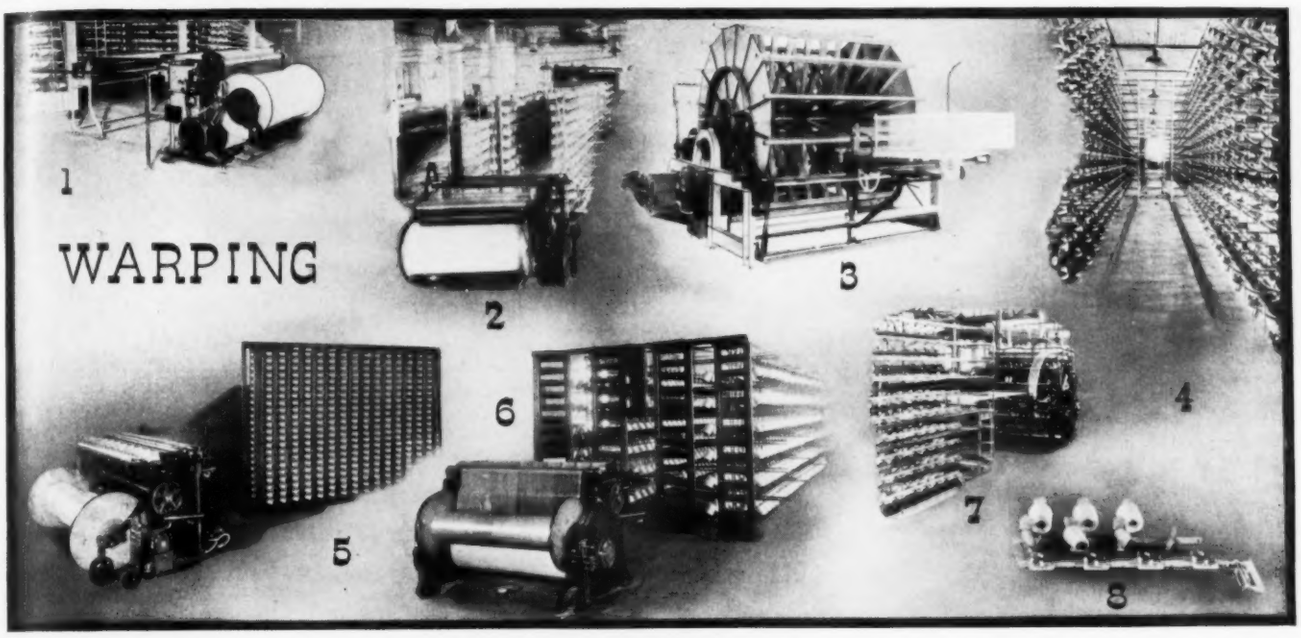
Entwistle also improved the expansion comb for rayon warpers and slashers by furnishing hardened dent wires to eliminate cutting and by developing an expanding device that would assure a uniform number of dents per inch no matter to what width the comb was expanded or contracted.

Cocker Machine & Foundry Co.

In 1926 the Cocker Machine & Foundry Co., Gastonia, N. C., was given an order for two standard section-beam warpers having a capacity of 800 ends of synthetic yarn. These machines were to be operated at a maximum speed of 40 yd. per min. and the section beams doffed from it were to be placed in back of a standard two-cylinder slasher for sizing in the orthodox cotton manner. When these machines were started up, considerable trouble was experienced in the way of broken filaments; and it was found that the basic cause for this was the slipping of the section beams on the warper cylinders at the time of starting. It was found that other mills which were warping synthetic yarns on cotton warpers were experiencing the same trouble.

To prevent this slipping, the Cocker company covered the entire face of the cylinder with cotton fabric, which acted as a cushion and partly overcame the difficulty. To make the cure complete, however, what are known as beam snubbers were developed and applied, these serving both to hold the beam more firmly on the warper cylinder and also to round up the yarn wound on beam barrels that were not round and true. These two changes in the slow-speed spool warpers, plus the use of the previously developed direct-pull electrical stop creel, which carries its drop wires in the creel itself, greatly improves the quality of synthetic-yarn section-beam warps, and the machines have been extensively adopted.

During this period, Cocker was developing high-speed cotton warpers and magazine cone creels. The latter led to the development of Cocker's eyeboard stop motion, which was located at the apex of the creels and a sufficient distance from the beam to insure the catching and tying of broken ends before they reached the beam. Since cones could be secured from the rayon producers at little higher cost than



1. Entwistle's high-speed beam warper. 2. Easton & Burnham warper. 3. Sipp-Eastwood's high-speed warper. 4. Sipp-Eastwood's creel with Lestershire spools. 5. Cocker's slow-speed warper drawing from revolving spools. 6. Cocker's high-speed warper drawing from cones. 7. Warp Compressing's creel on silk system. 8. Close-up of Warp Compressing's tensions.

skeins, weavers saw a great economy in using synthetic-yarn cones and so eliminating spooling costs, in addition to improving tension conditions by adopting the over-end principle. Cocker found little difficulty in applying its warpers proper to this system, but the creels proved to be something of a problem. The horizontal position of the cones, while entirely satisfactory on cotton yarns, proved totally unsuited to synthetic yarns. After more than a year of experimental work, a creel was developed which carried the cones in a position as nearly vertical as was possible with the magazining feature. At first individual tensions of the dead-weight washer type, such as had been used for the cotton yarns, were employed for the synthetic; but for getting best results from the latter it was found necessary to cushion the dead washer and grind the faces of both washers. While these tensions may not yet be considered perfect, the dead-weight type is believed the most efficient by many users of creel tensions.

Easton & Burnham Machine Co.

The Easton & Burnham Machine Co., Pawtucket, R. I., also builders of section-beam or cotton-type warpers, met the challenge of rayon by producing in 1930 a drumless-type machine. In this the driving contact is on the heads of the beam, rather than on the rayon itself, with a view to securing uniformity of slasher beams and avoiding any ironing effect.

Sipp-Eastwood Corp.

As we have already stated, the silk system of warping was the first applied to rayon. The Sipp-Eastwood Corp., Paterson, N. J., had always been a believer in that system (it still is, although today it builds a cotton, as well as a silk, type of warper); and when the magazine creel brought high speed and improved quality to the cotton method, Sipp-Eastwood undertook the task of adapting this new warping principle to the silk method. Its faith in the idea that this could be done was justified when, in 1931, it succeeded in increasing the speed of silk-type warping from the old maximum of 80 yd. per minute to as high as 320 yd. per minute through the development of a suitable over-end magazine creel and a warper improved to take the high speed. In consequence, mills can now turn out a warp of 4,000 ends, in four sections 2,000 yd. long with six leases, in about 2 hr., as against the 8 hr. formerly required.

Features of the new warper include rigid, vibrationless construction and a variable-speed drive which may be set to any desired speed and varied during the beaming operation. An indicator clock can be set to stop the warper according to any predetermined schedule for leases, cut marks, and section ends, and a multi-colored lamp shows whether the stop is for lease mark or section end. When the warper is running at maximum speed a light pressure on the brake treadle will stop it within a distance of three staves.

Each cone- or spool-carrier bracket of the Sipp-Eastwood over-end creel, which is adaptable to magazine loading, can be shifted individually or collectively to any horizontal or vertical spacing relationship. The revolving tension controls the yarn uniformly even when the warper is stopped or started suddenly, and also serves to make an electrical contact and stop the warper when an end breaks. An ingenious lighting system on the creel, connected with the revolving tension, enables the operator to locate a break quickly. Special fiber-head spools for this creel were designed by Lestershire Spool & Mfg. Co., Johnson City, N. Y.

Sipp-Eastwood's cotton-system warper drives directly from the beam head and will stop from high speed in ¼ ft. when the brake is applied.

Warp Compressing Machine Co.

Creels for the cotton system of rayon warping were developed by the Warp Compressing Machine Co., Worcester, Mass., in 1926. These were equipped with magazine attachments for cones and were designed to conserve floor space, the saving in length over previous equipment amounting to about 40%. Later these creels were applied to the silk system also.

The first model of creel was equipped with disk tensions; but, when it was found that this type of tension was throwing the twist back and causing the yarn to kink, the whorl type was developed. The purpose of the whorl itself, however, was not to act as a tension, but to serve as a stabilizer and absorb the jump caused by the traverse wind on the cone—the felt and the finger type serving to generate the tension before it arrived at the whorl. A later model of the finger tension was constructed with porcelain applied to the wires, and it was found that the porcelain acted as a static eliminator. Today the company applies both types of tension to its equipment with satisfactory rseults on both rayon and acetate.

Warp Sizing Machines

DURING the first few years following the commercial production of rayon in this country there were in use several different methods for sizing warp yarns. These included skein sizing; sizing during packaging, as in winding or coning; spool-to-spool sizing, creel-to-beam sizing; spray or wax-roll sizing on the completed warp while weaving in the loom; and sizing on the warp while winding from one or more beams to another. Gradually the last method superseded the

others, and today is the only one of any importance. Early users of rayon included both the silk weaver and the cotton weaver, each of whom had his own system of warp preparation. It was natural, therefore, that two systems of rayon warp sizing were evolved—one making use of modified cotton slashers, and the other utilizing special sizers designed to meet the needs of the silk manufacturer who was entering the rayon field, and of the cotton manufacturer who adopted the silk system of warp preparation for rayon. Both types of machines have been so modified and improved that they bear little resemblance either in appearance or performance to those originally used for sizing rayon. Particular attention has been paid to accurate control of stretch, tension, and temperature—all important factors in sizing rayon and acetate warps. The present trend in the design of sizing machines is to make them suitable for use with either system of warp preparation.

Van Vlaanderen Machine Co.

Almost coincidentally with the birth of the American rayon industry, Van Vlaanderen Machine Co., Paterson, N. J., constructed a rayon warp sizer, which was completed on Feb. 13, 1911, and sold to Bamford Bros. Silk Mfg. Co. (now Reliance Piece Dye Works). The word rayon had not yet been coined, and the machine was called a special thread mangle. The most important feature of this machine was the fact that it had individual drying cylinders. From this special thread mangle has evolved gradually over a 25-year period the Van Vlaanderen five-cylinder, high-speed rayon warp sizing machine.

Fitted with stainless steel cylinders and size pan, tension-control device operated by a handwheel, fittings for automatic temperature control of cylinders and sizing mixture, the latest model bears little resemblance to its prototype. Other refinements on the new sizer include an oscillating roller which imparts a slight cross wind to the warp to prevent slack and tight ends on the loom beam; variable-speed motor drive; absence of obstructive piping which makes it convenient for the operator to reach any inside point; automatic cut marker, which can be adjusted to any length of cut; and a double-check measuring system for raw and sized yardage, which ascertains the percentage of stretch and is assisted by a stretch regulator and scale. This machine is also built with a split-rod extension for the cotton system of warp preparation. In this case, the sizer is equipped with nip-roll drive and with a pressure-roll arrangement to act against the take-up beam to produce a hard and smooth warp on the loom beam.

Charles B. Johnson

In 1923 Charles B. Johnson, Paterson, N. J., began production of rayon warp sizers and since then has specialized exclusively in the manufacture of that type of equipment. The first machine was of the multi-cylinder type, having three cylinders. Experience with this machine led to a number of early improvements, such as an increase in the diameter of the cylinder to 23 in. to increase production, change in the position of the let-off, and synchronizing of the take-up mechanism with the drying cylinders to reduce tension on the warp. Later a variable-speed drive was installed between the motor and the machine proper and a device was added to permit application of any desired tension on the beam without interfering with the stretch. These and other improvements were incorporated in a new model, introduced in 1928, which had an operating speed ranging from 7½ to 30 yd. per min.

Two important improvements announced in 1920 were fully automatic temperature control of the size box and individual cylinders and the adoption of a high-pressure quetsch designed to give an even squeeze over the entire width of the warp and to insure complete penetration of the size. Soon afterward a five-cylinder sizer, having approximately 100% more drying surface than the three-cylinder machine, was brought out—primarily for handling acetate warps.

Other improvements followed—such as a new compensating drive, for both cotton and silk system sizers, to permit regulation of stretch; a new main drive, which included in one unit a motor, variable-speed transmission, slow-speed motion, and reversing motion; an adjustable cut marker; and a new draw-roll device which permits the warp to contract to practically its original length before the necessary tension is applied for the tightly wound loom beam.

Last year was announced the development of a conditioning unit, which can be applied to any Johnson rayon warp sizer now in use. This unit is designed to deliver the warp in a properly cooled and conditioned state and free from any brittleness of the size coating which might be caused by application of heat. Use of the conditioner also permits an increase in the speed and production of the sizer, due to the fact that the last cylinder can now be run hot, rather than cold, as was formerly recommended by leading authorities. A still further refinement to be made to the sizer was the replacement of the cone-pulley stretch control between the quetsch and the drying cylinders with a gear box designed to eliminate the possibility of slipping and to give positive control of stretch at all times.

Recently Johnson has introduced a special sizer only 28-in. longer than the standard five-cylinder machine, but having seven cylinders, which permit drying speeds up to 80 yd. per min. Embodied in this machine is a new end, which makes it possible in a few minutes to convert the machine from a cotton system sizer to a silk system sizer, and *vice versa*. This machine may be had with either a single or double drive, the double drive being for extra heavy warps sized at high speed. The take-up-beam drive on the new sizer is so arranged that it is possible to run it clockwise or counter-clockwise. Hence, when the cotton system is being used, the warps may be run over the beam; when the machine is converted to a silk system, the beam may be run in a reverse direction, so as to allow for the insertion of loom-beam papers.

Saco-Lowell Shops

After a number of years of development work, Saco-Lowell Shops, Boston, announced in 1924, that it had adapted its well-known cotton slasher to the sizing of rayon warps. This machine, which was of the single-cylinder type, having either a 5- or 7-ft. drying cylinder, as specified, differed from the cotton slasher in several respects. Thus, the size box was nearer the drying cylinder, a single-roll size box was used, the distance between the carrying and measuring rolls was shortened to one-fifth the former distance, and temperature controls were provided on both the size box and drying cylinder. As originally built, the slasher had a speed of about 30 yd. per min. Various improvements were made from time to time, until this year, when Saco-Lowell brought out an entirely new rayon slasher, as a result of experimental work carried on in conjunction with Manville Jenckes Co., Manville, R. I.

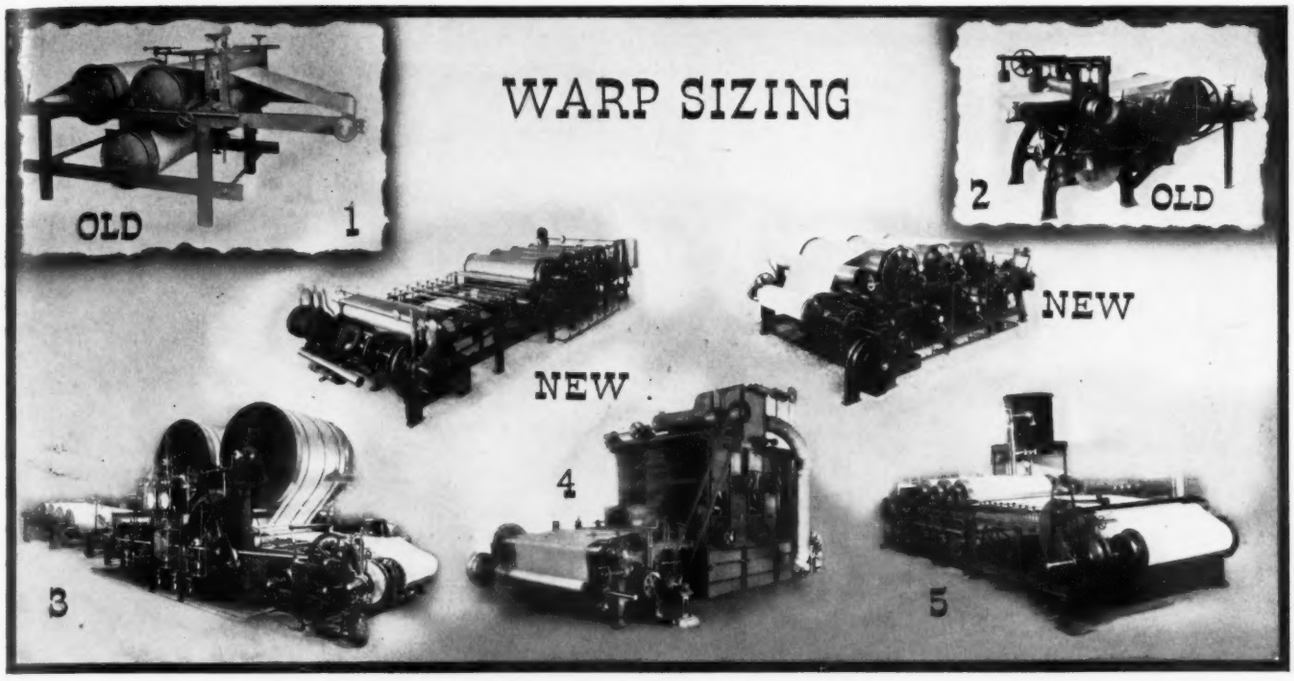
The new slasher is designed to run rayon warps at a speed of 80 to 100 yd. per min. and to give accurate control of the stretch of the yarn. This latter result is obtained by the incorporation of a stretch-control device, which is placed between the section beams and the size box to prevent slippage of the yarn in going through the size roll with consequent uneven stretching of the yarn. In front of the slasher are two measuring clocks—one driven by the stretch-control device, and the other by the delivery end. By setting the two clocks at zero at the beginning of each beam, and reading the difference at the end, one can determine accurately the percentage of stretch. In a recent test, the actual length of the warp was only 1 yd. off from the theoretical 1,900 yd. Tension is exerted upon the yarn in four distinct zones and this tension is controlled through adjustments in the component mechanisms.

Three drying cylinders are used, allowing progressive drying and high speed. Temperatures of the cans and the size, as well as the level of the size, are automatically controlled. When used in conjunction with a magazine creel, the slasher turns out warps with an end-and-end lease, so that they can be tied-in by machine. Aside from the high speed and other advantages already cited, the new slasher prevents warp shiners due to variation in stretch during sizing and eliminates the harsh, wiry yarn caused by excessive tension.

Cocker Machine & Foundry Co

About six years ago Cocker Machine & Foundry Co., Gastonia, N. C., developed a rayon slasher for use with the cotton system of warp preparation. By this time it had been fairly well established that better results could be obtained with machines having from three to five 23-in. cylinders than with the single-cylinder machine having one 7-ft. cylinder, as was originally employed with the cotton system. With the multi-cylinder machine, temperatures could be varied in the several cylinders and a greater amount of drying surface was obtained which gave increased drying speed and production. The first machines, made by this company were, therefore, of the multi-cylinder type. In designing the slasher, Cocker paid particular attention to the control of yarn tension during the sizing operation, made provision for tension control between the creels and size rolls, between the size rolls and the drying cylinders, and between the cylinders and the calender-roll assembly. The machine was designed also to make uniform the slipping of the friction disks in the beam drive of the head end and thus obviate the frequent recovering of the disks and to permit high operating speeds without heating of the friction drive.

In 1933 Cocker announced a new slasher, which is available in two arrangements—one for use with the cotton system, and the other adapted for the silk system of sizing from a single beam made on a horizontal warper. Among the features of the new machine are variable-speed drive; self-



1. Original Johnson rayon warp sizing machine introduced in 1923 and latest model seven-cylinder Johnson rayon warp sizer convertible to either cotton or silk system of warp preparation. 2. Van Vlaanderen rayon warp sizer built in 1911, and Van Vlaanderen five-cylinder high-speed warp sizer of present day. 3. High-speed rayon warp sizing machine developed by Saco-Lowell Shops in conjunction with Manville Jenckes Co. 4. Zell rayon slasher with hot-air drying system introduced by American Obermaier Corp. in 1934. 5. Cocker five-cylinder, cotton-system warp sizing machine.

aligning ball bearings on rolls, cylinders, etc.; indicating instruments on stretch- and tension-control devices; and cylinders and size boxes fitted with individual traps. Operating speeds up to 45 yd. per min. are possible with the standard five-cylinder machines, and at present Cocker is building two seven-cylinder machines designed for even higher speeds.

American Obermaier Corp.

Radically different from other types of rayon sizing machines is the Zell rayon slasher introduced in 1934, by American Obermaier Corp., Long Island City, N. Y. Particularly unusual is the design of the drying system, which permits drying of the warps with hot-air currents at a low degree of heat. Essentially this consists of a drying chamber, which incloses a series of hard-rubber skeletons over which the warp passes; inside the skeletons are fans which direct a uniform current of hot air against the entire width of the warp. If the machine is stopped for any reason, the heat is shut off automatically, so as to prevent "baking" of the yarn. The main advantage cited for this system of drying is that the yarn maintains its round shape, thus giving a finished fabric of livelier appearance than is obtained from yarn which has been flattened in the sizing operation.

Other features of the slasher include an indirect-heated size box adjustable for either light or heavy warps; differential cone-belt drive which permits instantaneous regulation of warp tension, speed adjustment giving any one of eight desired speeds; device to prevent slipping or misplacement of the warp threads during drying; and a stretch indicator which enables the operator to maintain a constant stretch at all times.

Weaving Equipment

AS WE approach the next department—the weave shed—in this survey of the contributions made by equipment builders to the progress of rayon, it is well to remind ourselves again that many machines and devices not designed or even materially modified for rayon have proved just as suitable as some of the equipment specifically designed for it. The shuttle-changing principle, which, for at least a considerable period, was the only good answer to the first-pick-tension problem, had been made use of, mainly by the Stafford Co., long before rayon had become important. The Rhode Island Warp Stop Equipment Co.'s K-A motion was and is suited to all yarns. The Warp Twisting-In Machine Co.'s equipment had been employed for years on silk.

Barber-Colman Co.

In the 1920's the Barber-Colman Co., Rockford, Ill., had established itself in a prominent position as a builder of textile machinery through its automatic spoolers and high-speed warpers for cotton, its warp-tying machines for cotton and wool, and its hand knotters for all yarns. By 1932 it had developed the first commercially successful warp-tying machine for rayon. This machine, known as model LS, differs from its predecessor for cotton and wool mainly in the fact that it ties from an end-and-end lease, which is so essential for the large numbers of ends in rayon warps, rather than from a flat sheet. It operates at 250 or more knots per minute and has no pins to pierce the yarn. It is 290 lb. lighter than the earlier model and much easier to handle, requiring one operator and one helper.

Stafford Co.

The Stafford Co., of Readville, Mass., was probably the first machinery company to announce a loom developed specifically for weaving rayon. That was in 1926, and the loom employed the shuttle-changing principle which Stafford had found particularly suited to silk. The major advantage in this principle is the fact that the loom can lay the first pick after a filling change with the same even tension that it lays the following picks. In this loom the warp beam was set farther back to reduce the strain on the yarn when the sheds were opening and closing, the whip roll was eliminated to reduce friction on the warp, and roller bearings were applied to crankshaft, bottom shaft, and take up roll to make the motions easier on the yarn, provide a lighter-running loom, save power, increase life of bearings and loom, reduce lubrication required, and lessen the danger of oil or grease stains being formed on the goods.

Draper Corp.

Draper Corp., Hopedale, Mass., took over the Stafford shuttle-changing rayon loom in 1931 and, using it as a basis, developed the C-model single-shuttle rayon loom, which it announced as available to the trade in 1933. Because in weaving rayon it is important to start and stop the shuttle with as little shock as possible, the C-model is designed without daggers

or frogs. To permit slowing down the shuttle and yet prevent smashes, the reed is loose when the shuttle is trapped and positively held during the regular flight of the shuttle and at beat-up. The action of the loom is not interrupted at shuttle change, this operation being effected in the fraction of a second that the shuttle is in the box. A new double-impulse let-off assists the accuracy of the take-up; and a device is provided to disengage the take-up pawl automatically when the loom stops, thus eliminating one cause of starting marks. A let-off release lever permits the weaver to take the tension off the warp for the over-night or week-end stop. The internal expanding brake and certain other features of the new X-model cotton loom have been applied to the C-model.

Lately there has been considerable progress in adapting the bobbin-changing principle to rayon weaving, mainly through the development of shuttles which will permit quicker tensioning of the newly inserted yarns. Draper's so-called "first-pick-tension" shuttle employs an eye that embodies two small pieces of metal pressed together by small springs. Therefore, the X-model loom, properly equipped, is being used to a greater extent for rayon; and the newer XK-model, which can be equipped with a 25-harness high-speed C&K dobby, is primarily a rayon loom.

This XK-loom, in addition to embodying the usual features of the X series, is built only one hand to allow the dobby to be placed 10 in. lower than in previous models. This position decreases vibration and allows for easier inspection and adjustment. The XK also boasts a silk-type take-up with large roll, a new automatic Bartlett let-off, a driving clutch with disk gripped firmly on both sides to take out end thrust, adjustable treadles, provision for large warp beams, and last, but certainly not least, the ability to weave rayons at 170 to 172 picks per minute.

Crompton & Knowles Loom Works

Crompton & Knowles Loom Works, Worcester, Mass., has experimented with the shuttle-changing principle to some extent since at least 1897; and, before the advent of rayon as a major textile fiber, it had employed the principle on 1x1-box duck and tire-fabric looms. By 1930 it had applied it to 2x1-box cotton weaving in its famous Cotton King loom. At the silk machinery show held at Paterson in 1931, it publicly demonstrated for the first time the Super Silk and Rayon loom, with shuttle-changing applied to 2x1-box weaving.

The loom shown at Paterson was the S3 model, and even when equipped as a non-automatic, it had many new features to commend it. Parts had been standardized to insure interchangeability, structural steel had been adopted for all lengthwise parts, the loom frame and many vital parts had been strengthened, a three-point suspension motor had been adopted, the clutch had been designed on the internal expanding principle, and a swing reed (held rigid at picking) had been provided.

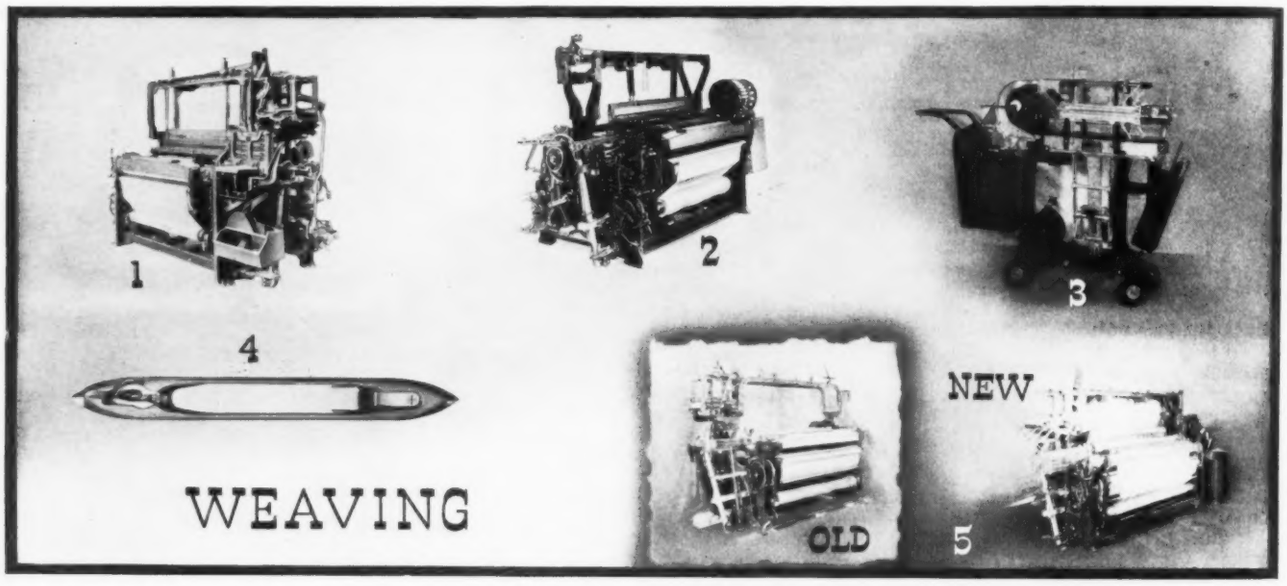
But even with these innovations applied to drop-box rayon looms, the S3 model was not considered complete, and early in 1932 C&K announced a new automatic let-off motion in which friction was eliminated as a factor in the amount of tension on the warp. This motion, which is entirely independent of whip rolls, links, gears, and ropes, is actuated every pick by means of a rod and lever drive from the laysword. Self-aligning ball bearings support the beam. Further improvements in the S3 were announced in 1933, including a simplified shuttle-changing mechanism, which, while it does not require slowing down or stopping of the loom at time of transfer, operates more gently and affords a shuttle life equivalent to that on non-automatic looms.

At the Southern Textile Exposition in 1935 C&K demonstrated the shuttle-changing principle applied to a 4x1-box Super Silk and Rayon loom. While this loom, which is known as the S4, is automatic on only two shuttles, it has wide application where two shuttles are required for the ground fabric and one or two additional shuttles are needed for decorative yarns. When this loom stops for a non-automatic replenishment of filling in one of the latter shuttles, which naturally exhaust slowly, the shuttle can be ejected from the box by the mere pressure of the weaver's foot on a conveniently located pedal. The two upper boxes hold the automatically controlled shuttles.

Steel Heddle Mfg. Co.

In 1926 Steel Heddle Mfg. Co., Philadelphia, met the challenge of rayon by developing a highly polished and specially formed heddle eye that would not chafe or otherwise injure the yarn. As deniers were reduced to 150 and lower, heddles of proportionately lighter weight were needed, and finally the Artex line of heddles was developed. These heddles are made in a graduated series of flat-wire gages, and it has been found that the selection of the correct gage for a given construction eliminates many fabric imperfections that formerly were not noticeable until the pieces were finished. These eyes have been found particularly desirable for acetate, where incorrect harness equipment was formerly responsible for much powder-like dust which settled on harness and reed. Steel Heddle also developed an Artex harness frame, which is heavy and strong enough to resist buckling and thus to prevent one type of interference with the orderly arrangement of the heddles and their ability to slide readily into their correct positions as governed by the motion of the thread.

Another important contribution made by Steel Heddle to the progress of rayon weaving was the introduction of the oval wires to reeds. These wires eliminate much of the bending and rubbing of the yarns as they enter the dents; and they press the threads together in any one dent only at the center of the dent, thus greatly reducing the friction to which the ends are subjected and permitting more ends to be placed in a dent than would otherwise be possible.



1. Draper's C-model shuttle-changing loom. 2. Draper's XK-model bobbin-changing loom. 3. New Barber-Colman warp tyer for rayon. 4. Shuttle made by U S Bobbin & Shuttle. 5. Old C. & K. 2x1-box non automatic dobby loom, and latest C. & K., model S4, 4x1-box shuttle-changing dobby loom.

J. A. Gowdey Reed & Harness Mfg. Co.

About ten years ago the J. A. Gowdey Reed & Harness Mfg. Co., Providence, R. I., adapted the Scotch hook reed to the use of rayon mills which wanted to make warps on the cotton system. This reed is used in back of the slasher, and it allows the operative to take an end-and-end lease in the large numbers of ends which are common to rayon work. The reed also, of course, acts as a guide for the warp threads as they pass through the slasher.

American Supply Co.

In 1930 the American Supply Co., Providence, R. I., developed for rayon looms the Asco metal reed with a cord specially treated to protect the dent wires from acid corrosion and otherwise refined for greater durability and flexibility.

Watson-Williams Mfg. Co.

The J. H. Williams Co., one of the two concerns which merged in 1930 to form the Watson-Williams Mfg. Co., Leicester, Mass., originated the tension eye for automatic and hand-threading rayon shuttles in 1922. It had found that in the demand for a sensitive, yet uniform, tension, rayon was the most exacting of yarns. Experimentation led to the development of a friction surface consisting of twin steel pads guided by a delicate encased spring which could be adjusted by a set-screw to accommodate different deniers. Danger of the rayon catching in the minute crack between wood and metal was eliminated by the development of a brass eye with a continuous outside leg. This spring-guided tension principle, which was applied to a center tension eye, has stood the test of time and has this year been applied to rear tension eyes as well. And, even more recently, a rear slant tension eye has been developed to give first-pick tension on bobbin-changing looms.

U S Bobbin & Shuttle Co.

As long as 25 years ago, a special shuttle for use in rayon weaving was developed by the U S Bobbin & Shuttle Co., now of Manchester, N. H. This was a plain shuttle with a hand-threading eye and was used in hand-operated looms. The tension was afforded by means of felt and furring.

Later in the development of rayon, U S designers made their first major contribution to the weaving of rayon in bobbin-changing, automatic looms. This was the "Jackson-tension" shuttle, named after its inventor; and it was first installed in the Gosnold Mill, New Bedford, in December, 1933. Features of the shuttle are the fact that it will give positive tension on the first pick and every pick in bobbin-changing looms, that it will eliminate loose and tight picks and scalloped selvages, and that its eye is adjustable to practically any degree of tension desired.

The next U S contribution to the rayon industry was the "unit-tension" shuttle which was designed and has proved its effectiveness for giving positive tension on the first pick in shuttle-changing box or plain looms. This shuttle eliminates the necessity for mops, elastic bands, pads, and similar tension devices. Once the tension is set, it is maintained without further adjustment.

Rayon Knitting

WHEN rayon first arrived on the scene, it found knitting machines better prepared than looms to handle it. In fact, except in the case of machines in which the needles are not operated individually—such as, notably, the full-fashioned hosiery machine—comparatively little serious difficulty has been experienced in adapting knitting mechanisms to the new material.

However, the first knitting rows hoed were not too smooth, and many machine refinements were necessary to improve rayon knit goods. Such a refinement, for example, is the tension control device which Hemphill Co. has applied to its fine-gage machines for handling wiry acetate and rayon yarns in reverse-plate knitting. The device consists of a unit series of roller tensions for each yarn being fed; and the yarn is fed to the needles over the rollers in a continuous flow, with all snap removed and with a higher tension on the face yarns than on the inside yarns.

Also the progress of rayon has been accompanied by a gradual increase in the fineness of knitting machines. As F. E. Paul, of Wildman Mfg. Co., ably puts it, "The development of 16 cut to 40 cut in progressive stages—namely, 22, 24, 28, 34, and 40—demanded a rayon which could be knitted on such cuts. The rayon producers were compelled to develop fine yarns which had the proper elasticity, tensile strength, and other necessary characteristics. In 1924 it was an impossibility to knit 150-denier on 28-cut machines with less than ten to fifteen damages per 25 lb. Today, under the same conditions, it is not unusual to knit 400 to 500 lb. without a damage."

Of course some machinery firms developed machines specifically for rayon in order to round out their lines of equipment. Such a machine is the Model B 9 built by Tompkins Bros. Co., in which the stitch is formed by one needle and one jack only and each stitch is completed before the next is started, thereby preventing cutting at knots and reducing straining and chafing of the yarn.

Dyeing and Finishing

SO far as regards machine design, rayon has probably exerted its greatest influence in the field of dyeing, drying, and finishing. This is due in part to the fact that the comparatively low tensile strength of rayon when it is wet makes it essential to reduce tension to a minimum to prevent damage to the yarn or fabric. Again, the properties of the synthetic fibers are such that they require more uniform treatment than do the natural fibers if variations in the finished product are to be avoided. Another factor which has become increasingly important in recent years is the desire to modify the original characteristics of rayon fabrics during the finishing operation.

It should be emphasized, however, that in the last ten years there has been considerable improvement in the design of dyeing and finishing machinery generally and that many of the new machines are entirely suitable for handling rayon, although they were not introduced for that purpose alone. One conspicuous example of this nature is the Tube-Tex machine for wet-spreading, extracting, processing, and drying tubular knit goods. This particular machine is used widely on rayon fabrics, but is equally satisfactory on cotton or wool. Another is the True-Shade all-metal dyeing machine. Numerous similar instances could be cited.

A. W. Buhlmann

Early attempts to skein-dye rayon yarn in hand tubs according to cotton methods gave some rather disheartening results. Frequently the yarn came out of the tub in such a condition that, if the rayon could be wound at all, the cost of skein-spooling ran to 75c. per lb. or more. Gradually the technique was improved; but the need for equipment especially adapted for dyeing rayon yarn was urgent. There was a ready made market, therefore, for the multiple skein dyeing machine, introduced by A. W. Buhlmann, New York, in 1919. In view of the superior results obtained—particularly the improved winding qualities of the yarn and the possibility of dyeing several hundred pounds of rayon in as many as 20 different shades at one time and on one machine—it is not surprising that within a few years a thousand units were sold in this country and Canada.

Dyers of rayon piece goods also had their problems and, to maintain a constant cloth speed and tension, often resorted to the expedient of running the fabric from "shell to shell" on the jig. The necessity for this was eliminated in 1927 when Buhlmann brought out a jig designed to give constant speed, uniform tension, and automatic reverse.

In 1930 Mr. Buhlmann was granted a patent for a process of treating rayon fabrics to reduce the undesirable high-luster characteristic of many of these fabrics and at the same time to impart a soft, mellow feel to the goods. This invention gave rise to the Yale finishing machine for decatizing.

Smith, Drum & Co.

Activities of Smith, Drum & Co. in the field of specialized equipment have centered on the production of skein dyeing machines. The first model, which was

brought out in 1925, consisted essentially of a number of porcelain reels mounted on a framework which was raised and lowered by means of a hydraulic ram. This machine was similar in principle to one which had been built for a number of years in Europe. There were, however, a number of new ideas incorporated in it, such as variable-speed motor and gear-shifting device to provide a wide range of speeds for the reels and Monel-metal tanks.

In 1931 this company announced an entirely new type of skein dyeing machine. Fundamentally, this machine consists of a rotatable perforated tube on which the yarn is hung, a Monel-metal tank for the dye-bath, and a pump which draws the liquor from the tank and forces it into the tube and through the yarn back to the tank. The outstanding features of this machine are: (1) a combination of slow movement of the yarn and rapid movement of the liquor, the entire bath passing through the yarn once each minute; and (2) the possibility of maintaining a totally submerged condition of the yarn with a short bath. Advantages of the new machine include elimination of tangling and matting of fine yarns; ease of sampling; better dyeing in a shorter time; a far greater improvement in winding qualities of the yarn than was obtained by the earlier reel machine; and low installation and labor costs.

Refinements in this equipment since it was originally introduced include first a change from manually controlled to semi-automatic movement of the yarn, and later to fully automatic yarn movement at predetermined intervals.

American Obermaier Corp.

In 1930 American Obermaier Corp., Long Island City, N. Y., introduced a reel-type skein dyeing machine, recommended especially for the application of vat colors. The outstanding advantage cited for the equipment is a unique method of driving the reels, designed to eliminate tension on the yarn and to keep the strands and tie bands in their original positions and thus maintain the winding qualities of the rayon. Speed of each reel is controlled individually; and leak-proof partition walls, adjustable between any desired number of reels, make it possible to dye either large or small lots, in one or more shades, at the same time.

About a year later, this company brought out a rayon package dyeing machine which had required five years' development work. This equipment is of all-Nickeline construction and embodies a unique circulation system for the dye liquors. Among the advantages claimed for it are elimination of skein winding, preservation of the original qualities of the yarn, elimination of bar effects, and possibility of guaranteeing absolutely even dyeing of 2-lb. packages.

H. W. Butterworth & Sons Co.

For many years before it went into the manufacture of the rayon spinning equipment described earlier in this section, H. W. Butterworth & Sons Co., Philadelphia, had been producing a variety of dyeing and finishing machinery. As the processing of rayon became increasingly important, much of the equipment previously used for silk was modified to the extent necessary for handling rayon. In addition, Butterworth developed a package dyeing machine primarily for rayon yarns. The dyeing kier consists of four major parts: an inner perforated cylinder, an outer solid cylinder, the bottom, and the top. A non-clogging pump is designed to insure an even flow of the dye liquor, which can be either from the inside out or from the outside in of the yarn packages. The rapidity of the flow of liquor, especially from the outside in, and the distribution of the dye liquor over the entire length of the yarn carriers by a double-acting connection with the pump are said to promote uniform and level dyeing. It is stated also that the air-tight construction of the kier makes the machine particularly adaptable for the dyeing of vat and naphthol colors.

Abbott Machine Co.

Four or five years ago Abbott Machine Co., Wilton, N. H., announced a new method and special equipment for dyeing worsted top and yarns. Later it was found that the machine is suitable for handling rayon, and last year Abbott brought out a special dye spool for rayon, on which the yarn is wound in a thin layer to permit good circulation of the dye liquor. At about the same time this company also refined the method of winding synthetic yarns and tops on the spools.

Van Vlaanderen Machine Co.

Although Van Vlaanderen Machine Co., Paterson, N. J., first started the manufacture of specialized rayon equipment with the warp sizing machine previously described, this company is perhaps even better known for its bleaching, dyeing, and finishing machinery. One of its earliest ventures in dyeing equipment for rayon piece goods was a constant-speed jig. Comparison of the accompanying illustrations of the original model and the latest model will give a clear idea of the advances which have been made. Features of the new machine include individual motor drive for either a-c. or d-c. current, device for giving constant tension throughout the dyeing operation, automatic reverse and stop, oscillating expander bars and rollers, stainless steel dye tub and immersion rollers, and overflow channel girts extended beyond the batch rolls to prevent splashing or dripping of the dye liquor on either side of the jig or on the floor.

Another comparatively early development was a continuous rope washer for rayon fabrics. This machine too, has been greatly improved. The latest model is designed to keep the cloth in semi-open form, incorporates a new system of water flow, and is designed to keep the cloth in contact with the liquors for a much greater percentage of time than was obtained with the older models. Cloth speeds as high as 120 yd. per min. are possible by using several washers in range.

Two of the latest Van Vlaanderen developments are an embossing machine for all-rayon or rayon-acetate crepes and a conditioning or decating machine. A special feature of the decatizer is a 12-in. perforated blanket cylinder which permits application of vacuum to the blanket to keep it dry and thus prevent rotting.

Morrison Machine Co.

Control of tension on the fabric is one of the most important factors in processing rayon piece goods, and in 1926 Morrison Machine Co., Paterson, N. J., entered the field of specialized rayon machinery with a dye jig designed to give such control. This jig was also equipped with ball bearings throughout to give smooth and easy running. Further important improvements have been made from time to time until the 1936 model differs as much from the 1926 model as that differed from the still older cotton jig. These improvements include free use of stainless steel and other corrosion-resisting materials which reduce cleaning time and reduce danger of dye spots and stains; totally inclosed helical gear drive running in an oil bath; more scientific mounting of immersion rolls and better brake control; and addition of a wrinkle-eliminating device and a special means for rapid loading and unloading of the machine.

The influence of rayon was felt likewise in the redesigning of Morrison's open soaper for piece goods. In the latest model of this machine each compartment is individually driven through synchronized motors and is built to give exact control of tension according to the particular fabric being run. Tanks and immersion rolls are of stainless steel; expanders are made of non-corrosive materials; like the jig, this machine is fitted throughout with ball bearings; and means are provided to keep the cloth free from scrimps and wrinkles.

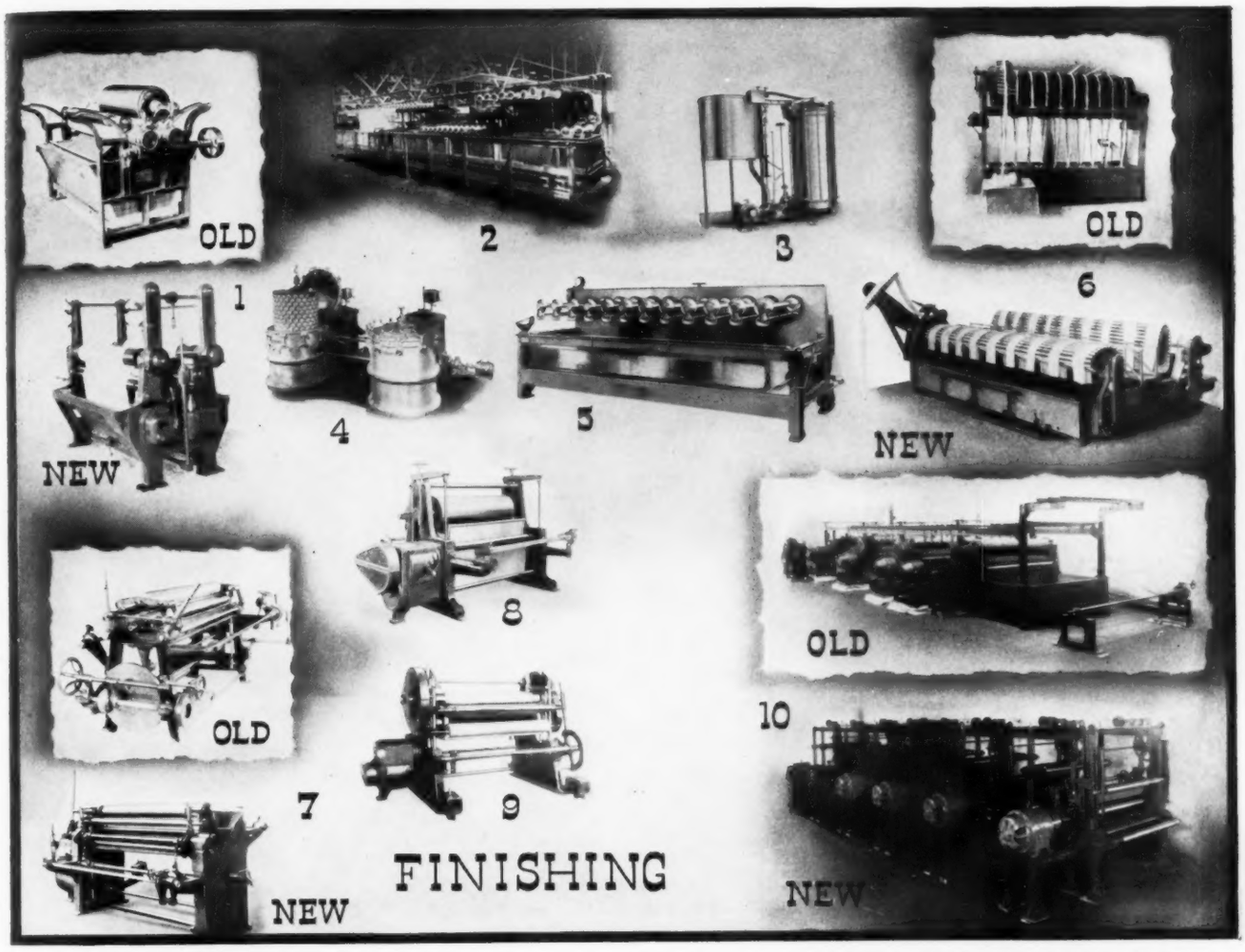
A two-roll, high-pressure quetsch, introduced a few years ago embodies a number of the mechanical features of the jig and the soaper, together with improved drive said to give approximately 100% increase in speed over earlier models. The Triune finishing machine brought out originally for silk has been modified to meet the requirements of the rayon finisher.

Two recent Morrison developments are a pad-dyeing machine and an embossing calender. Outstanding features of the padder are use of non-corrosive materials for the dye tank, squeeze rolls of special composition, quick-change gear box to give four or eight speeds as specified, improved let-off and take-up, and chromium plating on all parts of the machine handled by the operator. The embossing calender for rayon and acetate fabrics has a graduated pressure lever which is locked in the "off" position when not in use, to prevent destruction of the pattern through accidental engagement of the rolls while the machine is cold. Other features include a special arrangement for rapid changing of the rolls, quick-change gear box, and ball bearings throughout.

Textile Finishing Machinery Co.

Long a manufacturer of cotton finishing equipment, Textile Finishing Machinery Co., Providence, R. I., began in 1924 to modify various machines used for sheer cotton fabrics to meet the more rigid requirements which were set up by the increasing use of the synthetic yarns. Special calenders for rayon and open-width preparing or soaping machinery were the first two types of such equipment to be developed. The need for tension control at high cloth speeds was met by the use of synchronized motors on the washers, together with the fitting of the machines with ball bearings. Later improvements are designed to give absolute control of tension at any predetermined degree and adjustable speeds over a range of from 12½ to 125 yd. per min.

Other specialized equipment developed by



1. Original Van Vlaanderen constant-speed jig and latest Van Vlaanderen constant-speed jig. 2. Buhlmann multiple skein dyeing machine. 3. Package dyeing machine introduced by American Obermaier Corp. in 1931. 4. Butterworth package dyeing machine developed primarily for rayon yarns. 5. Latest type Smith-Drum skein dyeing machine. 6. Early model of rope washer developed by Van Vlaanderen and new continuous washer by Van Vlaanderen. 7. Two-roll quetsch introduced by Morrison Machine Co. in 1921, and latest Morrison high-pressure quetsch with quick-change gear box. 8. Pad dyeing machine developed by Morrison Machine Co. 9. Morrison calender for gray embossing of acetate crepes. 10. Open soaper for rayon fabrics showing early use of synchronized motors by Textile Finishing Machinery Co., and open soaper for rayon fabrics developed by Textile Finishing Machinery Co.—latest model.

Textile for processing rayon include padders for tinting and dyeing, hydraulic calenders for the treatment of underwear and lining fabrics, and a new design of air dryer which operates in direct connection with a printing machine.

Rice, Barton & Fales

Known for a great many years as a manufacturer of printing machines for all types of fabrics, Rice, Barton & Fales, Worcester, Mass., in 1932 announced the development of an electric dye jig for processing rayon and acetate piece goods. An unusual feature of the jig is the fact that a small d-c. motor is geared to each of the two beam roll shafts, the two motors being so connected that substantially constant cloth speed and tension are obtained. Automatic reversal of the direction of the cloth is accomplished by means of a photo-electric cell. An oscillating device, which can be put into operation by turning a switch, is designed to prevent uneven dyeings due to seepage of the dye liquor through the cloth while the jig is stopped. Provision is made for installation of an electric counter which will automatically stop the machine after a given number of ends. Other features include stainless steel construction; ball bearings, self-contained totally inclosed drive; spreader attachment for preventing wrinkles; and dynamic braking to prevent paying off of the cloth into the tank when the jig is stopped. In addition to the advantages cited above, the electric jig permits an increase in production of about 33% over that obtained with the old mechanical jigs, and at the same time makes it possible for one operator to attend more machines.

Grand Rapids Textile Machinery

After two years of experimental work, in 1926, Grand Rapids Textile Machinery Co., Grand Rapids, Mich., introduced a machine for finishing tubular-knit rayon fabrics. This machine embodied a new principle in finishing fabrics of this type, and only a few minor modifications from the original model have proved necessary. The spreader is placed in an upright position and the fabric is steamed on both sides, spread, subjected to a blast of cold air to remove the steam and cool the cloth, and rolled up. One of the advantages of this machine is that it reduces to a minimum the undesirable moiré effect often encountered in tubular-knit rayon fabrics.

In 1928 Grand Rapids brought out a combination finishing and slitting machine, which is substantially the same as the finishing machine, except for the addition of power-driven knives for slitting the fabric on one or both edges. When the cloth is slit on both edges, it is rolled up simultaneously into two single-thickness rolls, so that binding cut from the rolls is of a single end. At about the same time, a binding cutter was introduced to cut into strips of various widths the rolls made by the slitting machine. A feature of the binding cutter is a device for sharpening the 14-in. power-driven blade and putting it into condition before each cut.

Also introduced in 1928 was a rayon laying-up machine. Several years previously, the company had developed an automatic length cutting and laying-up machine for cotton underwear fabrics; but this proved to be too complicated for rayon and would not control the fabric because of its smooth surface. In the rayon machine, the

method of laying the cloth on the table by power-driven rolls is retained, but the automatic mechanism for cutting the fabric at the end of the lay is dispensed with. Instead, the machine is made with a clutch which permits the ends to be drawn up evenly without waste and which also makes it possible to cut out and lap imperfections and turn holes to the edges quickly.

Three other pieces of equipment brought out in 1928 were a new type of dye tub, a spreading and looping machine, and an extractor loader. Features of the dye tub include a dye distributor, dye circulator, and overhead rinse pipes. This machine is designed to speed up dyeing time without causing streaks or shading. The spreading and looping machine is a modification of an earlier machine developed in 1912 for cotton and wool fabrics; and embodies an upright pipe and wet spreader in place of the horizontal pipe and spreader on the older models. The vertical arrangement eliminates sticking of the rayon fabric to the metal and permits the twist to be taken out and the goods to be looped into trucks for a loop dryer or hung automatically in loops to be transferred to a dry room. The extractor loader is also an adaptation of an earlier model for cotton and wool. Still another development is a rayon garment finisher which operates on the same principle as the rayon finishing machine and which obviates pressing with a hand iron or a mangle. The garment finisher gives about six times the production of a hand iron and twice that of a mangle and handles garments for which the mangle is not suitable.

General Machine Co.

Within recent months General Machine Co., Paterson, N. J., has brought out two improved machines for finishing rayon piece goods, and is now completing the development of a third piece of equipment which will be available shortly. The first of the two machines now ready is a decatizer, differing from previous models in that it has two drums or cylinders. This feature permits decatizing of a roll of goods with one run of the blanket.

The second machine is a vacuum extractor, fitted with a steam ejector in place of a pump. Advantages cited for this method are steadier vacuum without noise, and lower cost of operation.

The equipment to be made available soon is a sueding machine for rayon fabrics.

David Gessner Co.

In 1928 two rayon finishing concerns, independently of each other, but simultaneously, requested the same worsted mill to run samples of their material on a semi-decating machine made by David Gessner Co., Worcester, Mass. The results of these experiments prompted Gessner to design and build a special semi-decater for rayon fabrics. Incorporated in this machine was a new method for distributing the steam. The first machine built operated at about 20 yd. per min. The latest model has a capacity of 100 yd. per min., and has been made lower for convenience of operation. The apron has been improved to give a better finish and to permit a wider variety of finishes.

Haring & Stephens Co.

In principle, there is little or no difference between hydro-extractors for rayon

and those used for other textiles. On the other hand, the advent of synthetic yarns spurred extractor manufacturers to refine their products and a number of machinery builders have redesigned one or more models with the primary object of meeting the requirements of mills processing rayon. For example, Haring & Stephens Co., Paterson, N. J., has recently developed an extractor primarily for rayon work. Features of this machine include stainless-steel basket, motor drive through V-belt, clock-type timer, automatic brake, interlocking guard covers, and foot control for all operating levers.

Rochester Engineering & Centrifugal Corp.

In 1924, Rochester Engineering & Centrifugal Corp. (then American Laundry Machinery Co.) brought out an overdriven extractor for use in rayon throwing and dyeing establishments. One of the principal improvements over similar equipment for the older fibers was use of Monel metal construction to prevent snaring of the goods. This centrifugal has now been superseded by an underdriven model with automatic timer and brake, which automatically stop the machine after a predetermined run. Other mechanical improvements have been incorporated to withstand greater out-of-balance loads and to reduce vibration.

American Tool & Machine Co.

Unusual among centrifugals is the machine for rayon and other yarn packages, developed about four years ago by American Tool & Machine Co., Boston. This consists of a series of small extractors into which individual packages of yarn are placed. Any number of extractors can be used in one battery and each has its own motor. Among the advantages ascribed to this machine are: no damage to paper cores; no distortion of packages; possibility of running small batches economically; material saving in loading, spinning, and unloading time; reduction in power costs; and elimination of line surges. More recently the machine has been redesigned with one motor to two extractors.

Proctor & Schwartz

Proctor & Schwartz, Philadelphia, has been active not only in the development of drying equipment used by rayon yarn producers, but also has brought out several types of machines for drying rayon yarn and piece goods in the textile mill. One of the most recent developments of this nature is a continuous skein drying and conditioning machine, equipped with a traveling skein protector, which prevents the skeins from rubbing against the stationary sides of the machine in their travel through it. This device consists of a flexible material, hung skirt-fashion from the chain conveyor so that it travels with the poles. It permits the full loading of every pole, instead of leaving several inches of bare space at each end, as is often necessary with other types of dryers to prevent the outermost skeins from rubbing, whipping, fraying, marking, or soiling.

Another Proctor dryer is designed for use when it is desired to set the twist of rayon yarn. This machine embodies a humidifying and drying process in which the rayon on bobbins is subjected to an even circulation of warm, moist air for the time required to set the twist, and then is brought back to normal temperature and the desired uniform moisture content.

For piece goods, either dyed or finished, this company developed the Multipass Airlay dryer. Drying in this machine is rapid and uniform and is accomplished without tension or pulling; therefore the machine is particularly suited to the stretchy sort of acetates and the popular novelty crepes. Proctor & Schwartz has also brought out loop dryers for piece goods and a dryer for fibrous and loose materials, such as rayon waste and rayon staple.

A good idea of what improvements in dryers means to the mill is the experience of a well-known rayon dryer who recently replaced two older automatic dryers with one new skein dryer with double-tier conveyor. This new dryer can turn out a production equal to that of both old dryers in 41% of the time, and with a total net saving in drying costs of 37%.

Philadelphia Drying Machine Co.

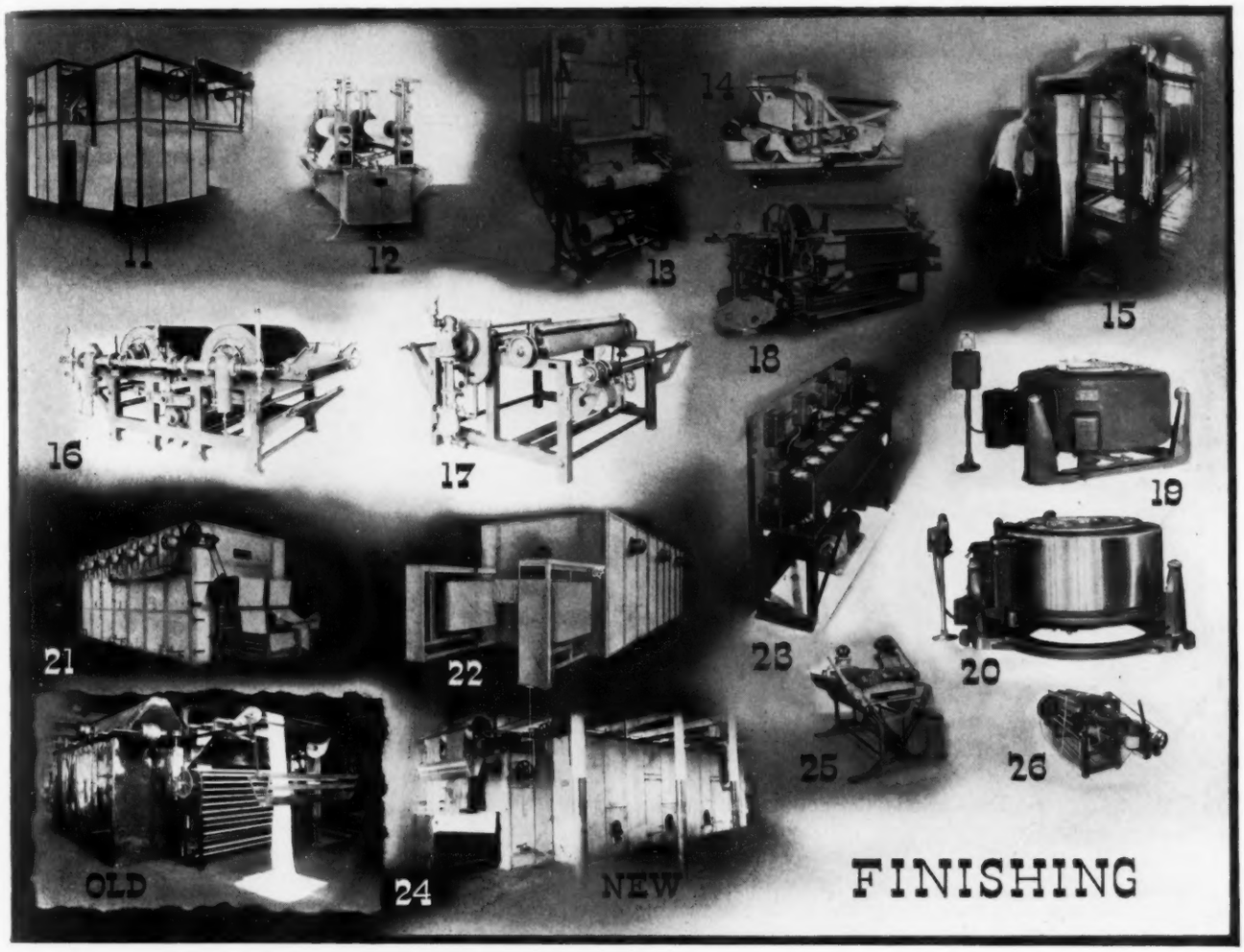
In the discussion of equipment used by rayon producers mention was made of the yarn drying and conditioning machines developed by Philadelphia Drying Machinery Co., Philadelphia. This company has been engaged also for many years in building dryers for rayon piece goods, specializing particularly in loop dryers. The first of these dryers was a redesign of the Hurricane dryer brought out in 1901 for cotton and silk fabrics.

The early rayon loop dryers used very moderate air circulation velocities to avoid blowing the goods off the poles. Poles were made with wood covers, so that the goods were not in contact with the hot metal. On this type of machine, rayon woven and knitted goods were dried for a number of years. During this time, many improvements have been incorporated in the design to permit the use of more rapid air circulation, faster drying, and better quality. Perhaps the greatest advance has been in the use of rotating conveyor poles, wood covered. The fabric is gradually advanced over these poles, eliminating stick marks and wrinkles, and permitting full shrinkage.

The heating systems in loop dryers, as well as in other rayon dryers, have been greatly improved by the use of extended-surface radiation or "fin pipe." This permits rapid heating and high temperatures when needed. The latter is of particular advantage in the comparatively recent anti-crease processes, where high temperatures are essential. Fans suitable for use with standard-speed motors have been developed, giving greater air circulation; and interior baffling has resulted in uniform distribution of the air and greatly increased production.

B. F. Sturtevant Co.

Recently B. F. Sturtevant Co., Hyde Park, Boston, Mass., has developed a special high-speed tenter-frame dryer for rayon piece goods. This equipment differs only in detail from that company's dryers for cotton fabrics; but is particularly interesting in that it was built to meet the particular requirements imposed by rayon.



11. Air dryer designed by Textile Finishing Machinery Co. for operation in direct connection with a printing machine. 12. Rice, Barton & Fales all-electric dye jig announced in 1932. 13. Finishing and slitting machinefor tubular-knit fabrics made by Grand Rapids Textile Machinery Co. 14. Grand Rapids rayon laying-up machine. 15. Grand Rapids wet spreading and hanging machine for tubular-knit fabrics. 16. Two-cylinder decating machine developed recently by General Machine Co. 17. Improved vacuum extractor brought out by General Machine Co. 18. Semi-decating machine developed by David Gessner Co. 19. Haring & Stephens hydro-extractor with clock-type timer. 20. Under-driven extractor with timer and automatic brake developed by Rochester Engineering & Centrifugal Corp. 21. Proctor Multipass Airlay dryer for piece goods. 22. Proctor & Schwartz automatic yarn dryer with traveling skein protector. 23. American Tool & Machine equipment for extracting individual packages of yarn. 24. Early model of Philadelphia Drying Machinery Co. automatic loop dryer, and latest model of Philadelphia Drying Machinery Co. automatic loop dryer. 25. Sjostrom sueding machine. 26. Parks & Woolson thread-clipping machine.

The fabric for which the dryer was designed is a 39-in. material, running 6 yd. to the pound dry weight, containing initially a moisture content of 80% of the dry weight, and having approximately 11% moisture content finished. The frame of the dryer is 80 ft. long, and drying is accomplished by the warm air supplied by fans to the top and bottom of the cloth line through the same system of duct work and nozzles as in the cotton dryer. The dryer is divided into four compartments; the first compartment at the wet end is maintained at 180 to 200° F.; the second, at 150 to 170°; the third, at 120 to 140°; and the fourth, at about 70° F. and 75% relative humidity. The outstanding advantages of this equipment are uniformity of drying, low operating costs, and high operating speed of approximately 100 yd. per min.

R. L. Sjöström & Co.

As early as 1925 finishers began to use the equipment made by R. L. Sjöström & Co., Lawrence, Mass., for cooling and conditioning rayon fabrics. In designing an improved cooling and conditioning machine announced last year, particular attention was paid, therefore, to making it suitable for rayon.

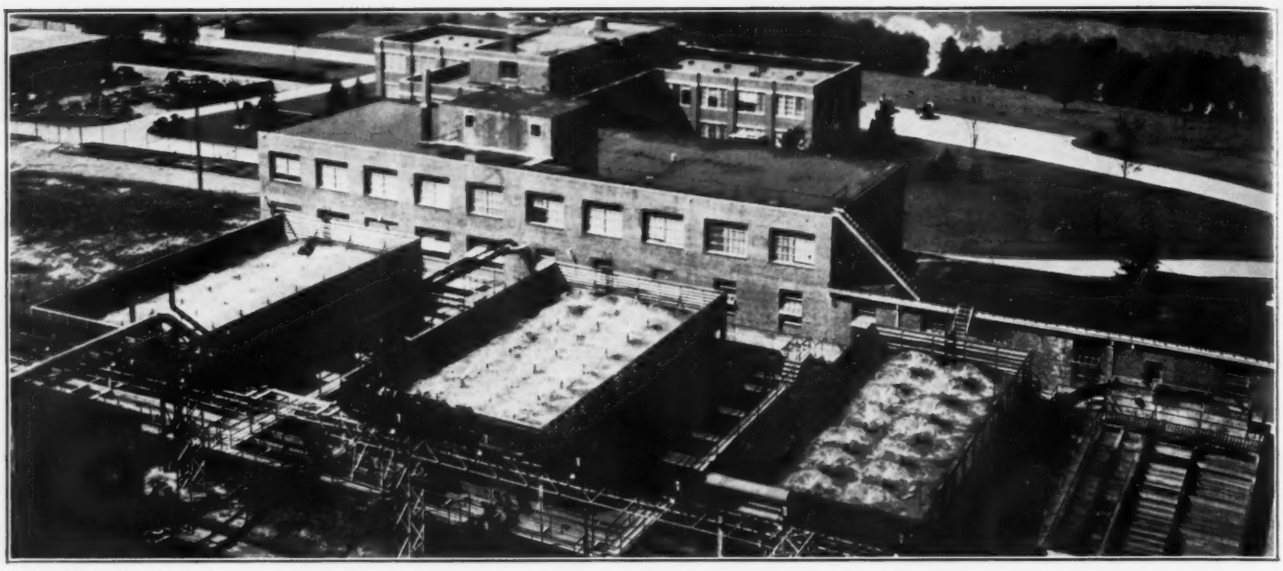
Early this year Sjöström brought out an entirely new type of machine intended primarily for producing a nap or pile on fabrics woven or knit from continuous-filament rayon. This equipment, known as the Seide sueding machine, produces a napped or suede effect either over the whole width of the fabric or in any width of stripe lengthwise. In this machine, the fabric is subjected to the action of abrasive rollers which cut the surface filaments to about 10% of the thickness of the cloth, thus producing fibers to form the nap. The outstanding feature of the sueding machine is that it gives a variety of new effects.

Parks & Woolson Machine Co.

Discovery a few years ago that decating imparted a desirable finish to rayon fabrics induced Parks & Woolson Machine Co., Springfield, Vt., to adapt the

semi-decater to the finishing of woven and knit goods made from synthetic yarns. Recently this company has announced an improved semi-decater with 36-in. cylinder for rayons, which operates at a speed of over 100 yd. per min. Among the advantages cited for the new model are that it imparts a fuller and softer handle to the fabric, is so designed that there is no possibility of a wet apron or fabric, has an adjustable apron roll for straightening the apron while running, gives uniform steaming and cooling conditions, and requires only one operator.

An even more recent development is a fabric thread-clipping machine (suitable also for cottons and silks) which supersedes the four-blade cotton shear for use on rayon. This machine is designed to operate at 100 yd. per min. and to trim both sides of the fabric at the same time. It is stated that with the new thread-clipping machine the goods are sheared the entire length of the cut, with no unshorn places to be trimmed by hand; that no automatic seam-passing device is necessary, as it is impossible to catch seams, sluff-offs, holes, or pieces of shuttle; and that maintenance costs are extremely low, since renewal or regrinding of blades is unnecessary.



Courtesy Hungerford & Terry

11,000,000 gal. per day water filtration plant used by Tennessee-Eastman Corp., Kingsport, Tenn.

ACCESSORIES VITAL

Air-conditioning, water-treating, and similar equipment made rayon commercially possible

IN THE FOLLOWING article, the author confines his discussion to auxiliary equipment used by the producers of synthetic yarns. The same general types of accessory equipment which are essential to the production of rayon aid the textile manufacturer and processor in the making of rayon fabrics of the highest possible quality obtainable today. While it is impossible to discuss here the individual contributions of the many manufacturers who have developed this auxiliary equipment, it must not be forgotten that to them great credit is due for the success with which the industry is now able to handle synthetic materials.

OTHER articles in this issue have covered the progress in equipment which is primary to the rayon industry. But there is much equipment that is by no means peculiar to rayon, yet, without which, not a pound of the synthetic fiber could have been produced. In this group are included equipment for air conditioning, for water treatment, for power application, and for measurement and control of process variables. Brief mention will be made also of the materials of construction for rayon equipment.

The history of air conditioning, chronologically, corresponds closely to the period of development of the rayon industry in the United States. It must not be inferred that the rayon industry first gave air conditioning its impetus, for it was in cotton textiles, actually, that the need for control of air quality was first recognized. Nevertheless, 1911 first saw air conditioning established as a separate science, with the presentation of two papers by Willis H. Carrier, before the American Society of Mechanical Engineers. Earlier work by Carrier—as well as by others, including William Grosvenor, W. L. Fleisher and S. W. Cramer—had laid the foundations for the new science, both from the theoretical and practical standpoints. Carrier and Cramer had previously gone into the business of producing and installing air conditioning equipment for industrial purposes. But 1911 seems to have marked the real starting point for the industry as we know it today.

Air Conditioning

The last 25 years have witnessed air conditioning's advance from an almost unknown art to a science that is recognized even by the man in the street and in every part of the world. It represents a period, not of fundamental development, but rather of recognition and of refinement. Not a method that is used today was unknown in 1911. In fact, the major types of equipment now used in rayon and other industrial plants are generally much like those of earlier years. Yet the refinements of a quarter century have been vastly important. Better types of heat-transfer surfaces have lowered both equipment and operating costs and made for more compact equipment. Improvements have been effected in air-distribution methods; in the silencing of the air; in its filtering, both with cleanable and with throw-away type filters. Great advances in refrigerating machinery and in refrigerants have made such equipment less expensive to own and run and have reduced the possible dangers from refrigerant leaks to the vanishing point. During the period, the reciprocating refrigerating machine has encountered competition from several directions. Centrifugal compressors have been applied both to organic refrigerants and to the water-vapor machine. Decided improvement of the steam-jet exhauster within the last five years has made it possible to substitute this device from mechanical compressors in a great many of air-conditioning installations which are, however, chiefly in the comfort conditioning field. Recently, chemical methods of dehumidification have come into prominence, with the likelihood that in the future they may be almost as much used as the mechanical methods are today.

Water Treatment

What type of water treatment will be required in a rayon plant depends on the available water supply. In many cases coagulation of suspended impurities, followed by settlement and filtration, is all that is required. Less frequently a part of the water used re-

quires softening in addition to filtration. Both types of purification were fully worked out 25 years ago; but, as in the case of air conditioning, many important improvements in equipment have appeared during the interval. In the case of softening equipment, most of which is of the base-exchange type, neater designs, automatically operated and regenerated, have appeared in recent years. Filters have in large part graduated from the wood-tank variety to sand filters housed in steel tanks, designed for ready back-washing. Settling basins are now frequently of the continuously, automatically cleaned type, of which the first, developed in the mining industry, came into being at about the beginning of this period. Chemical feeders, for supplying the coagulants, are nearly all of recent development, many of those now in use being products of the last decade.

Equipment for the development and application of power has gone through many radical changes during rayon's period of growth. Motors themselves have been much improved, in part as regards electrical characteristics, but even more in form, in lower cost and lesser weight and in longer life. Recent years have seen the development of the welded motor frame, and particularly of the splashproof motor which is so necessary wherever frequent washing down of floors and equipment is practiced. About ten years ago a marked trend became evident toward the use of individual motor drive to replace the older forms of gang drive in use during rayon's earlier years. For a considerable time it appeared as if the small individual motor had things all its own way. Just then, however, the pivotted motor base made its appearance, for the first time making short-center belt driving truly satisfactory. With this came the modern technique of group driving, an individually tailored combination of motor, belts, and such other transmission equipment as was needed. Proponents of the individual motor countered with the gear-head motor, a combination of motor and speed reducer which made direct motor connection possible, almost regardless of the speed of the driven machine. As a consequence of these improvements, the trend today is in no wise certain. But the science of power application has been considerably clarified, and the best type of drive for a particular purpose is in most cases being employed.

The motors which have been developed for modern, high-speed pot spinning machines have been described elsewhere in this issue. Generating equipment of special type has been developed for rayon spinning and includes both frequency changers and specially designed turbo-generators capable of operating at any desired frequency within a rather broad range. Frequency-changer sets in both induction and synchronous types have been developed and improved high-frequency transformers have been brought out.

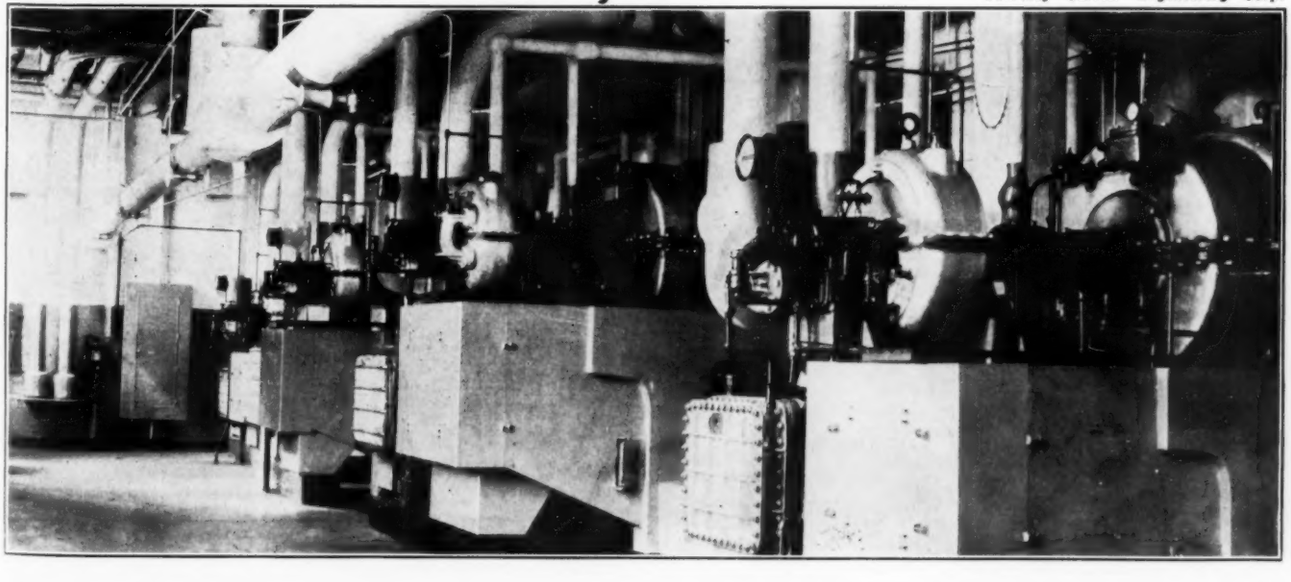
Control Instruments

Even if many pages were available for such a review, it would be possible to touch only on the high spots of the developments in control instruments that have taken place in the past 25 years. So various have these been, in fact, that no inclusive general statement is possible. In 1911 recording thermometers and pressure gages had assumed something approaching their present forms, as had the industrial thermometer and the indicating pressure gage. The basic methods of flow measurement were well known, and all of the several methods now used in pyrometry has been discovered and, to a limited extent, applied. Self-actuated pressure controllers for temperature were known, and electrical contact controllers had also been applied. But with these exceptions, it is substantially correct to say there were no control instruments as we know them now. Today there is a suitable controller for every conceivable process variable. Within the last few years intensive development of anticipating and anti-hunting instruments has taken place, together with a great variety of instruments capable of ready adjustment in the field to match the requirements of any particular process.

Except in a few particulars, materials of construction for equipment have not been major problems in the rayon industry. Considering the three processes still in operation in the United States, mild steel, cast iron, and alloy cast irons, lead, nickel and its alloys, glass, aluminum, hard rubber, platinum, porcelain and chemical stoneware, phenol-formaldehyde plastics and wood have served for most of the requirements. Use of reinforced plastics in the construction of high-speed spinning pots and the substitution of lacquered steel or aluminum bobbins for the glass bobbins previously used on bobbin spinning machines have been discussed in another article. Monel metal and nickel have been substituted to a large extent for the sheet-iron separator plates formerly used in the viscose steeping press. Nickel has become increasingly important both in the manufacture and in the shipment of the caustic soda used for rayon production. Another recent use for nickel has been in evaporators for the recovery of glauber salt from waste spinning bath. More or less special alloys of gold and platinum or iridium as well as platinum and iridium have been used extensively for spinnerets and tantalum has come into some prominence for this purpose. Some use is made of stainless steels, particularly the special types used for the acetylation step in the manufacture of cellulose acetate yarn.

Centrifugal refrigeration machine operating in the Meadville, Pa., plant of Viscose Co. of America

Courtesy Carrier Engineering Corp.



DYES AND CHEMICALS

Used in processing rayon yarns and fabrics

IT WOULD be difficult to over-estimate the value of the contribution of dye and chemical manufacturers to the growth of the American rayon industry. A vast amount of effective research has resulted in level-dyeing colors for viscose, special dyes for cellulose acetate, soaking and sizing compounds, yarn lubricants, desizing and scouring agents, dyeing assistants, and delustrants and other finishing compounds.

Following is a list of trade names employed for these products. As many of the chemicals are sold under their chemical names, the list should be used in conjunction with the Buyers Guide in the *Textile World Yearbook and Catalog*. Where company names and trade names are the same, no listing is made here, except where necessary for clarity. For future revision, advice on omissions or on new products will be appreciated. Letters in parentheses refer to manufacturers, listed on page 110.

TRADE NAMES AND USES OF CHEMICALS USED IN PROCESSING RAYON

Abopone—*Sodium borophosphate.* Flameproofing and finishing agent (GP).
Acetamine—Acetate dyes (DuP).
Acetamine Diazo—Acetate dyes (DuP).
Acetole Size—Gelatine-base warp sizing compound (W).
Akcocene—Scouring agent (ACC).
Akoil 1-4-3—Wetting and penetrating agent, dyeing assistant (ACC).
Aktivin—*Sodium toluene sulphochloramide.* Bleaching, scouring, stripping agent (A).
Aktivin S—Solubilizing agent used for preparing starch sizes, finishes, and printing pastes (A).
Albatex BD—*Sodium metanitrobenzene sulphonate.* Protective agent to prevent facing in discharge printing (C).
Albatex PO—Penetrating agent, dyeing assistant, and stripper for vat dyes (C).
Albone C—*100-Volume hydrogen peroxide.* Bleaching and oxidizing agent (DuP).
Algol—Vat dyes (G).
Aliphatic Ester Sulphate—Penetrating and wetting agent; dyeing and printing assistant; finishing compound (OOC).
Alkanol B Pat.—*Sodium alkyl naphthalene sulphonate.* Wetting and conditioning agent (DuP).
Alkanol M-48—Wetting agent used in caustic solutions for creping rayon (DuP).
Alkanol M-54—(See *Alkanol M-48*).
Alkanol M-60—(See *Alkanol M-48*).
Alkanol S—*Sodium tetrahydro naphthalene sulphonate.* Dispersing agent used as a printing assistant (DuP).
Alkanol SA Pat.—*Sodium alkyl naphthalene sulphonate.* Wetting and conditioning agent (DuP).
Amaldehyde—*Zinc hydrosulphite formaldehyde solution.* Stripping agent (JC).
Amalgol—*Sulphonated fatty alochol.* Detergent; wetting, scouring and emulsifying agent; dyeing assistant (JC).
Amanthrene—Vat dyes (AAP).
Amanil—Direct dyes (AAP).
Ameran—Throwsters' tints (AAP).
Amidazo—Developed dischargeable dyes (JC).
Amidine—Direct dyes (JC).
Amiduroil—Wetting and penetrating agent; dyeing assistant (AD).
Amzo 1R—Scouring agent (USC).
Antifoam LF—*Mixture of lower fatty alcohols.* Antifoaming agent used in sizing baths and printing pastes (DuP).
Antilustrole—Delusterant (W).
Apomine—Direct dyes (PDC).
Appretole 3-0—Dispersing agent; softener (W).
Aquaresin—*Glycol bori borate.* Softener and finishing agent (GP).
Aquarol—One-bath water repellent and spot-proofing compound (AC).
Aquasol—*Highly sulphonated castor oil.* Wetting agent; dyeing assistant; finishing compound (ACC).
Aquatex—Water repellent and spot-proofing agent (WP).
Arctic Olive Oil Soap—*Soap.* Detergent, scouring agent, soaking agent (CPP).
Arctic Syntex T—Detergent, wetting and emulsifying agent, scouring agent, dyeing assistant (CPP).
Arcy—Starch-solubilizing agent used in preparation of warp-sizing and finishing compounds (WC).
Areskap—Wetting and penetrating agent; detergent (MC).
Aresket—Wetting agent for use in alkaline solutions (MC).
Aridex WP—Water repellent and spot-proofing agent (DuP).
Arkogel—Warp sizing compound (AC).
Arostit RFL—Reducing agent used in discharge printing (S).
Arostit ZET—Reducing agent used in discharge printing of cellulose acetate (S).
Artificial Silk—Direct dyes (GC).
Artisil—Acetate dyes (S).
Avirol AH Ex.—Wetting agent and dyeing assistant (NAC).
Avirol OS—*Technical oleyl alcohol and sulphated lauryl alcohol derivative.* Emulsifying agent used in making self-emulsifying oils and rayon oils (DuP).
Avirol WS—*Stearyl alcohol and a sulphated alcohol derivative.* Emulsifying agent used for making self-emulsifying waxes (DuP).
Avitex AD Pat.—*Sulphated oleyl alcohol.* Non-oxidizing liquid finishing agent and dyeing assistant (DuP).
Avitex C Pat.—*Sulphated higher alcohol.* Non-oxidizing paste finishing agent (DuP).
Avitex SF Pat.—*Sulphated stearyl alcohol.* Non-oxidizing paste finishing agent (DuP).
Avitex W Pat.—*Sulphated and free stearyl alcohol.* Non-oxidizing finishing agent (DuP).
Benzanol—Direct dyes (AL).
Benzine Soap S-263A—Spotting Agent (JW).
Benzo—Direct dyes (G) (CCW).
Benzo Viscose—Direct dyes (G).
Bestowax—Water-emulsifiable wax used as a finishing agent (PMC).
Blancal—Scouring agent (RCC).
Brilliant Avirol L-142—(See *Avitex SF Pat.*).
Brilliant Avirol L-144—(See *Avitex AD Pat.*).
Brilliant Avirol L-168—(See *Avitex W Pat.*).
Brilliant Avirol L-200—(See *Avitex C Pat.*).
Brosco Dull Finish—Delusterant. (SB).
Brosco Rayon Oil T—Conditioning agent for knitting yarns (SB).
Brosco Rayon Oil WW—(See *Brosco Rayon Oil T*).
Calcodur—Direct dyes (CCC).
Calcoloid—Vat dyes (CCC).
Calcomine—Direct dyes (CCC).
Calconese—Acetate dyes (CCC).
Calcosol—Vat dyes (CCC).
Calex Crystals—*Calgon derivative.* Water softener: scouring, bleaching, dyeing, and finishing assistant (WP).
Calgon—*Sodium hexametaphosphate.* Water softener; scouring, bleaching, dyeing, and finishing assistant (CAL).
Camacyl—Acetate dyes (JC).
Carbanthrene—Vat dyes (NAC).
Carbicrome DS—Chromium mordant (CC).
Carbitol—*Monoethyl ether of diethylene glycol.* Solvent for dyes, conditioning agent, and constituent of finishing compounds (CCCC).
Carosolv ML—Solvent used as a scouring agent (CAE).
Castopole—*Double sulphonated castor oil.* Wetting and penetrating agent; scouring compound; dyeing assistant (USO).
Castrolite—*Sulphonated castor oil.* Wetting and penetrating agent; scouring agent; dyeing assistant (RCC).
CC Softener—Softener and finishing agent (MEL).
Celanthrene—Acetate dyes (DuP).
Celascour—Scouring agent and dyeing assistant (AAP).
Celatints—Throwsters' acetate tints (AAP).
Celax—Water emulsifiable mineral oil used as a yarn lubricant (PMC).
Cellitazol—Acetate dyes (G).
Celliton—Acetate dyes (G).
Cellosolve—*Ethylene glycol monoethyl ether.* Solvent for dyes; spotting agent; dyeing assistant; wetting and dispersing agent (CCCC).
Celogel—Warp sizing compound (PMC).
Cel-Ray Scourer—Scouring agent (OOC).
Celutate—Acetate dyes (Z).
Ceranine S—Stearine-base softener and finishing agent (S).
Ceranine W—Sulphonated-oil-base softener and finishing agent (S).
Cerol S—Water repellent and spot-proofing agent (S).
Cerol T—One-bath water repellent and spot-proofing agent (S).
Cerol TFS—(See *Cerol T*).
Certified Flakes 718—*Soap.* Detergent; scouring agent; soaking agent (ASW).
Certified Throwster Tints—(UST).
Chamosheen—Finishing agent (OOC).
Chloramine—Direct dyes (CCW), (S).
Chlorantine—Direct dyes (C).
Cibacete—Acetate dyes (C).
Cibanaphtols—Azoic dyes (C).
Cibanone—Vat dyes (C).
Cindiazo—Developed dyes (CCW).
Cohansey Waterproofing Compound—Water repellent (K).
Cominol GAR—Wetting and penetrating agent; scouring, dyeing assistant (CO).
CNA Finish—Wax-type finishing compound (MEL).
Concental—Sulphonated tallow. Softener and finishing agent (PMC).
Cream Softener—*Sulphonated tallow.* Softener and finishing agent (ACC).
Cream Softener JB—*Sulphonated tallow.* Softener and finishing agent (JW).
Crepe Gum Filler—Soaking agent for crepe (CAE).
Cyanegg—*Sodium cyanide.* Used in rayon manufacture (DuP).
Daxad—*Generic name of various polymerized organic salts of sulphonic acids of the alkyl-aryl type.* Dispersing agents (DA).
Deceresol OT—*Ester of sulpho-dicarboxylic acids.* Wetting, penetrating and emulsifying agent; dyeing assistant (ACC).
Decrolin—*Basic sulphoxylate of zinc formaldehyde.* Stripping agent (G).
Degomma 4GS—Desizing agent for removing gelatine or glue (RH).
Degomma 80F—Desizing agent for removing starch (RH).
Delustran D—Delusterant (S).
Delustran ST—(See *Delustran D*).
Delustrant V-14—Delusterant (HP).
Delustrant V-45—(See *Delustrant V-14*).
Delustro—Delusterant (LS).
Demino—Antifoaming agent (MC).
Diacel—Acetate dyes (Y).
Diagen—Azoic dyes (DuP).
Diamine—Direct dyes (G).
Diastafor PXR—Desizing agent for removing gelatin and glue (SBI).
Diastafor TP—Desizing agent for removing starch (SBI).
Diastazyme—Desizing agent (JW).
Diazine—Developed dyes (NAC).
Diazo—Developed dyes (G).
Diazonol AC—Desizing, scouring agent (AC).
Digestase—Desizing agent (MD).
Diglycol Laurate—*Glycol laurate.* Wetting, penetrating, and emulsifying agent; detergent (GP).
Diglycol Stearate—*Glycol stearate.* Constituent of delustering compounds; thickening agent in printing (GP).
Diphenyl—Direct dyes (GC).
Dipyrazo—Developed dyes (PhC).
Discolite—*Sodium sulphoxylate formaldehyde.* Reducing agent used in discharge printing (RCC).
Dispersine T—Dispersing agent for acetate dyes (S).
Dry-Tex-Ol—One-bath water repellent and spot-proofing agent (P).
Dullatone D—Delusterant (OOC).
Dullatone L—(See *Dullatone D*).
Duller W—Delusterant (SCP).
Dull Finish CSD—Delusterant (S).

Dull Finish W-567B—Delusterant (JW).
Dull-Lustre—Delusterant (CAE).
Dulstan—Delusterant (SCP).
Dultex—Delusterant (SC).
Dunntex 25—Gelatin-base warp-sizing agent (TWD).
Dunntex (40 to 500)—*Gelatin.* Soaking agent for crepe (TWD).
Dunntex CR—(See *Dunntex 25*).
Rayon—Direct dyes (DuP).
Dye Penetrator R—Highly sulphonated wetting and penetrating agent and dyeing assistant (OOC).
Dyestrip—*Stabilized titanous sulphate.* Stripping agent (SCC).
Elastine—Warp-sizing agent (SH).
Elast Mix—Warp-sizing agent (SH).
Erie—Direct dyes (NAC).
Esco Savon—*Blend of Textile Escolite and soap.* Detergent and scouring agent (CD).
Esotoo—*Liquid sulphur dioxide.* Reducing agent used in manufacture of viscose and as an anti-chlor (VS).
Exol—Scouring agent (SC).
Exsize—Desizing agent (PP).
Fabritex 5—Printing gum (RCC).
Fastusol—Direct dyes (G).
Fiberite—Scouring agent (WP).
Finish KB—Finishing agent (S).
Finish NS—Slip-proof finishing agent (S).
Finish WFS—(See *Finish KB*).
Finishing Compound AR—Water repellent and spot-proofing compound (SB).
Finishing Compound HR—(See *Finishing Compound AR*).
Flexin P—Softener and finishing agent (A).
Formalide—Direct and aftertreated dyes (Y).
Formopon—*Sodium sulphoxylate formaldehyde.* Reducing agent in vat printing (RH).
Formula 10—*Oleate soap.* Detergent; scouring agent; soaking agent (CPP).
Gardinol LS Pat.—*Sodium sulphate of oleyl alcohol.* Detergent; emulsifying agent (DuP) (PG).
Gardinol WA Pat—*Sodium sulphate of lauryl alcohol.* Detergent, wetting agent; emulsifying agent; dyeing assistant (DuP) (NAC) (PG).
Gum 122—Finishing agent (KP).
Gum 260—Finishing agent (KP).
Halowax 2017—*Chlorinated naphthalene.* Delusterant (H).
Hartex Finish BX-9—Non-foaming soluble wax used as a finishing agent (HP).
Hartex Oil K-40—Scouring agent and dyeing assistant (HP).
Hartex Rayon Oil V-69—*Self-emulsifying sulphonated coconut oil.* Soaking agent; sizing compound (HP).
Hartex Size HF—Warp sizing compound for acetate yarn (HP).
Hartex Weighter—Organic weighting agent for knit goods (HP).
Hartex Weighter KF—Metallic weighting agent for knit goods (HP).
Hartogel K—Warp-sizing agent; soaking agent for crepes (HP).
Hartopene K—*Pine-oil derivative.* Dyeing assistant (HP).
Heveatex—*Latex.* Combining agent; waterproofing agent; sizing agent; printing assistant in discharge printing; finishing compound for coated fabrics (HC).
Hevo Finishing Oil 128—Finishing agent (HV).
Hevo Gum—Printing gum (HV).
Hevtex Vat Gum 55—Printing gum for use in vat printing (HV).
Houghto-Size AC—Warp-sizing agent (EFH).
HTH—*True calcium hypochlorite.* Bleaching agent (MA).
Humectol—Stripping agent (G).
Hydraldehyde—Reducing agent used as a stripper (WP).
Hydraphtal Pat.—Wetting and scouring agent (DuP).
Hydrite—*Sodium hydrosulphite.* Reducing agent used in vat dyeing (USO).
Hydroform—Vat dyes (PCC).
Hydrogenated Wax Sticks—*Hydrogenated wax in stick form.* Laid on warps in the loom to assist in weaving (K).
Hydrosol—Wetting and penetrating agent for use in throwing; mildew retardant in soaking, backwinding, and yarn lubrication (LS).
Hydrosulfite AW—*Sodium hydrosulphite formaldehyde.* Stripper; reducing agent in vat dyeing and discharge printing (AC).
Hydrosulphite AWC—*Sodium formaldehyde sulphoxylate.* Stripping agent; reducing agent in discharge printing (JW).
Hydroxcene—Soaking compound for crepe (K).
Hydroxy Acetate Size 15—Warp-sizing agent (K).
Hydroxy Art Silk Boil-Off Oil—Scouring agent (K).
Hydroxy French Size—Warp-sizing agent (K).
Hydroxy K-7-F—One-bath water repellent and spot-proofing compound (K).
Hydroxy M Oil—Wetting agent; dyeing assistant (K).
Hydroxy Rayon Oil 6-W—Knitting oil; yarn lubricant (K).
Hydroxy Rayon Oil B-C—(See *Hydroxy Rayon Oil 6-W*).
Hydroxy Rayon Oil 6-5—(See *Hydroxy Rayon Oil 6-W*).
Hydroxy Rayon Oil 118—(See *Hydroxy Rayon Oil 6-W*).
Hydroxy Size 3—Warp-sizing agent for viscose and spun rayon (K).
Icyl—Direct dyes (DCA).
Igepon T—Detergent, wetting, and emulsifying agent; scouring agent; dyeing assistant (G).
Immersol TX—Wetting agent; scouring, bleaching, and dyeing assistant (NC).
Impregnole—One-bath water repellent and spot-proofing compound (W).
Indanthren—Vat dyes (G).
Indigosol—Acid esters of vat dyes (CC).
Invadine N—Wetting, penetrating, and emulsifying agent; dyeing assistant (C).
Ivory Chips—*Soap.* Detergent; scouring agent; soaking agent; finishing agent (PG).
Kali Gel 3—Soaking compound for crepe (K).
Kalpinol 1—Wetting and penetrating agent; dyeing assistant (K).
Kapeco Paste—Finishing agent for tubular knit goods (KP).
Katanol—Mordant for basic dyes (G).
Kemopene 207—*Pine-oil derivative.* Detergent; scouring agent; desizing agent; dyeing assistant (KP).
Kemopole Oil—*Sulphonated oil.* Wetting and penetrating agent; dyeing assistant (KP).
Kinksettolit—Conditioning and twist-setting agent (HI).
Klisol H-23—*Sulphonated oil.* Finishing agent (HP).
Laureltex C—*Sulphonated coconut oil.* Soaping agent for crepe (LS).
Leucosol—Vat dyes (DuP).
Liovatine S—*Sodium salt of benzylsulphanilic acid.* Printing assistant (S).
Lotol—*Latex.* Combining agent; waterproofing compound; sizing agent; printing assistant in discharge printing; finishing compound for coated fabrics (NG).
Loupole W-950—*Monopole oil base containing solvents.* Scouring agent (JW).
Lubriknit—Conditioning agent and yarn lubricant (HI).
Luxosheen—*Mixture of sulphonated and neutral fats.* Finishing agent (JW).
Lustre White PW—Finishing agent (NC).
Lykopon—*Sodium hydrosulphite.* Reducing agent in vat dyeing and stripping (RH).
Mellol 107—*Specially treated olive oil.* Sizing and finishing agent (PMC).
Mellol 175—*Specially treated olive oil.* Finishing agent for hosiery and piece goods (PMC).
Mellol 220—*Specially treated olive oil.* Antifoaming sizing agent (RMC).
Mel-o-Tex—Softener and finishing agent (ACC).
Meon—Conditioning agent (BS).
Mercerol—Wetting agent (S).
Merclor—*Sodium hypochlorite solution containing 12 per cent available chlorine.* Bleaching agent (MMC).
Merclor B—*Sodium hypochlorite.* Bleaching agent (MC).
Metso—*Sodium metasilicate.* Detergent; scouring agent (PQ).
Midland—Vat dyes (D).
Migasol PC—Water repellent and finishing agent (C).
Migasol PJ—One-bath water repellent and spot-proofing compound (C).
Mikah—Brand of sizing agents and printing gums (NA).
Minerol—Fiber lubricant for staple rayon (BS).
Monocel—Acetate dyes (Y).
Monopole Oil—*Double-sulphonated castor oil.* Bleaching and dyeing assistant; finishing agent; wetting agent (JW).
Morpelene Acetate Size Bricks—Gelatin-base warp-sizing agent (TCP).
Morpelene Rayon Size Bricks—Gelatin-base warp-sizing agent (TCP).
Morpeloil 303—Soaking agent for crepe (TCP).
Morpeloil 407—Scouring agent and dyeing assistant (TCP).
Morpeloil 426—Finishing agent for knit goods (TCP).
Morpeloil 732—Coning or knitting oil and yarn lubricant (TCP).
Morpeloil 735—(See *Morpeloil 732*).
Moytol—Wetting and penetrating agent; dyeing assistant (SCP).
Nacconol KP—Detergent; emulsifying, wetting, and scouring agent; dyeing assistant (NAC).
Nacconol KPR—(See *Nacconol KP*).
Nacelan—Acetate dyes (NAC).
Napthanil—Azoic dyes (DuP).
Napthanil Diazo—Azoic dyes (DuP).
Naphtol—Azoic dyes (G).
Nekal A—*Sodium alkyl naphthalene sulphonate.* Wetting agent (G).
Nekal BX—(See *Nekal A*).
Neomerpin N—*Alkyl naphthalene sulphonic acid.* Wetting agent used in printing pastes (DuP).
Neomerpin VD Pat.—*Sodium alkyl naphthalene sulphonate.* Wetting agent with foam-reducing qualities used with vat colors (DuP).
Neopen SS Pat.—*Sodium abietene sulphonate.* Wetting and dispersing agent used in printing pastes (DuP).
Neotone T—Delusterant (DuP).
Niagara—Direct dyes (NAC).
Nilo TC—Emulsifying agent (S).
Nitrox—Bleaching agent used in dyebath to obviate preliminary bleaching (SCC).
No-Odorol—Finishing agent (ACC).
Nopcov—*Highly sulphonated olive oil.* Dyeing assistant; finishing agent (NOP).
Nopco ATO—Colloidal one-bath water repellent and spot-proofing compound (NOP).
Nopco 111—Oil used in conjunction with size or gelatin as a soaking agent for crepe (NOP).
Nopco 1545—Wetting agent; penetrant; scouring agent; mildew-preventive (NOP).
Nopco 1556—Emulsifiable coning oil for warp, filling, and knitting yarns (NOP).
Nopco 1762—(See *Nopco 1556*).
Nopco 1887—(See *Nopco 1556*).
Nopco 1921-D—Emulsifiable, non-oxidizing oil used as a finishing agent for yarns (NOP).
Nopco Size 1—Granulated size used as a soaking agent for crepe (NOP).
Nopco Size 2—Soaking agent for crepe (NOP).
Nutrosan FEM—Scouring agent; dyeing assistant (NC).
Nyacet—Acetate dyes (NC).
Nyagene—Developed dyes (NC).
Oakite—Detergent and scouring agent (O).
Oil 4-M—Penetrating and dispersing agent used as a scouring and dyeing assistant for cellulose acetate (RCC).
Oil 300—Soaking compound for crepe; finishing agent (KP).
Olate—*Sodium oleate soap.* Detergent; scouring agent; soaking agent; finishing agent (PG).
Oleo Glyceryl Sulphate—Softener; yarn lubricant; emulsifying and penetrating agent; dyeing assistant; finishing agent (OOC).
Olivesco—*Blend of Textile Escolite and olive oil soap.* Detergent and scouring agent (CD).
Olive Flakes 735—*Soap.* Detergent; scouring agent; soaking agent (ASW).
Onyxol ST—Softener and finishing agent (OOC).
Oratol—*Sulphonated fatty alcohol.* Penetrating agent and scouring compound (JW).
Oxamine—Direct dyes (G).
Oxy-NO-J—Anti-oxidizing agent used in vat dyeing (ACC).
PAC—*Formaldehyde.* Mildew preventive and aftertreating agent (DuP).
Pacol 5—Soaking agent for crepe (PMC).
Palmito Glyceryl Sulphate—Scouring and finishing agent (OOC).
Paranol—Direct dyes (NC).
Parapon R—Softener; finishing agent (AC).
Parapon SA—Softener; penetrating agent; dyeing assistant (AC).
PBL-Oil—Bleaching assistant (SC).
Penetrall—Wetting and penetrating agent; dyeing and printing assistant (IAC).
Penetrol—Wetting and penetrating agent; dyeing assistant (HV).
Penotex—Wetting and penetrating agent; scouring agent; dyeing assistant (WP).
Pentasicon—Wetting and penetrating agent; dyeing assistant (M).
Pent-Lev XXX—Penetrating agent; dye solvent for vat colors (OFZ).
Peregal O—Penetrating agent; dyeing assistant (G).
Pergluton—Finishing agent (M).
Permanol N—*Synthetic resin.* Finishing agent to produce an anti-crease finish (CAE).
Permeko—*Sodium alkyl naphthalene sulphonate.* Wetting agent (JC).
Pharmasol—Azoic dyes (CC).
Pheno—Direct dyes (HM).
Phosphamized Finishing Oils—Non-oxidizing finishing agents (OOC).
Pluto—Direct dyes (G).
Plutoform—Direct dyes (G).
Polyphenyl—Direct dyes (GC).
Polyzime P—Desizing agent (TL).
Ponsol—Vat dyes (DuP).
Pontagen—Azoic dyes (DuP).
Pontamine—Direct dyes (DuP).
Pontamine Diazo—Developed dyes (DuP).
Pontamine Fast—Direct dyes (DuP).
Prestabit Oil—Dyeing assistant (G).
Printogen—Antifoaming agent used in printing (S).
Printsols—Dyes for printing regenerated cellulose rayon (NAC).
Protexall—Water repellent and spot-proofing agent (SIM).
Protolin W—Zinc hydrosulphite. Stripping agent (RH).

CONTRIBUTION OF DYE AND CHEMICAL MANUFACTURERS . . .

Protozyme T—Desizing agent for removal of glue and gelatin (JW).
Pyrazol Fast—Direct dyes (S).
Pyrazolon—Direct dyes (PhC).
Pyrotex—Penetrating agent; dyeing assistant (SCP).
Quaker Fin-O-Tex 1—Finishing agent (Q).
Quaker Fin-O-Tex 60—One bath water repellent and spot-proofing agent (Q).
Quaker 404—Conditioning agent (Q).
Quaker 405—(See *Quaker 404*).
Quaker 407—Conditioning agent for knitting yarns (Q).
Quaker 412—Softener and penetrating agent (Q).
Quaker 415—Emulsifiable mineral oil used as a knitting oil (Q).
Quaker 475—Gelatin-base warp-sizing agent (Q).
Quaker Iso Gum—Vegetable gum used as warp-sizing and finishing agent (Q).
Quaker TF 298—Delusterant (Q).
Radiactine—Algin-base dyeing assistant (S).
Ramasit—Water repellent and spot-proofing agent (G).
Rapidase—Desizing agent used for removing starch (WC).
Raygomm T—Warp-sizing compound for regenerated cellulose rayon (SH).
Raygomm 92—(See *Raygomm T*).
Raygomm 306-T—(See *Raygomm T*).
Raygomm NCA/NF—Warp-sizing agent for cellulose acetate (SH).
Raylubric 100—Processed oil used as a softener in warp-sizing (EFH).
Rayogel C—Soaking compound for crepe (LS).
Rayon—Direct dyes (DuP).
Rayon Crepe Softener—Softener and finishing agent (RCC).
Rayon Oil 19A—*Water-emulsifiable mineral oil with vegetable oil base.* Knitting oil (PMC).
Rayon Oil 999—Non-oxidizing conditioning agent used as a knitting oil (RCC).
Rayon Scour A—Scouring agent (S).
Rayonol—Direct dyes (JC).
Rayonyxol-F—Finishing agent (OOC).
Rayonyx Finish—Finishing agent (OOC).
Rayonyx Scourer OB—Scouring agent used in one-bath process of scouring and dyeing (OOC).
Rayscour A—Scouring agent for knit goods (K).
Rayscour B—(See *Rayscour A*).
Rayspin Compound A—Soaking agent for cuprammonium crepe (K).
Rayspinol 6-W—(See *Rayspin Compound A*).
Reducin NS—*Dimethyl benzyl phenyl ammonium chloride.* Reducing agent used in discharge printing (S).
Reducin S—*Calcium salt of disulphonated dimethyl phenyl benzyl ammonium chloride.* Reducing agent used in discharge printing (S).
Reductone B—Reducing agent used as a stripper (WP).
Resolin NF—Wetting agent (S).
Revatol S—*Sodium salt of meta nitro benzene sulphonic acid.* Protective oxidizing agent for vat dyed fabrics and to prevent facing in discharge printing (S).
Revertex—*Concentrated latex.* Combining agent; waterproofing compound; sizing agent; printing assistant in discharge printing; finishing compound for coated fabrics (RC).
Rigan—Direct dyes (C).
Rinsfors L—Scouring agent (S).
RHonite Powder 611—*Synthetic resin.* Finishing agent to produce anti-crease finish (RH).
RHonite Solution 414—*Water-soluble synthetic resin.* Finishing agent to produce permanent finishes and to impart wooly feel to rayon (RH).
Rongalite C—*Sodium hydrosulphite formaldehyde.* Stripping agent; reducing agent used in vat and discharge printing (G).
Rongalite CL—Reducing agent used in discharge printing (G).
Ruxite—Self-emulsifying oil used as a yarn lubricant, softener, and finishing agent (LS).
Sandocarnit—Wetting agent (S).
Sandofix—Aftertreating compound for fixing direct colors (S).
Sandozol KB—Dispersing agent; dyeing assistant; and finishing compound (S).
Sandozol N—Wetting agent (S).
Sanitose H—Skein sizing agent (OOC).
Sanitose S—(See *Sanitose H*).
Sapamine FL—Softener and finishing agent (C).
Sapamine KW—Softener, dyeing assistant, and finishing compound (C).
Scouring Oil 245—Scouring agent (HV).
SC Softener—Softener and finishing agent (MEL).
Serizyme—Desizing agent for removing glue and gelatin (WC).
Setacyl—Acetate dyes (GC).
Shirlan A—Salicyl anilide; mildew-proofing agent (DuP).
Shirlan D—(See *Shirlan A*).
Shirlan Extra—(See *Shirlan A*).
Silco Softener—Softener and finishing agent (SB).
Silk Finishing Oil R—Softener used in combination with delusterants and weighting materials (SB).
Silk-O-Fast A—Finishing agent for imparting permanent silky feel (OOC).
Silk-O-Fast B—(See *Silk-O-Fast A*).
Silvatol I—Spotting agent (C).
Sitol—*Sodium-M-nitro benzene sulphonate.* Mild oxidizing agent used as a protective agent in scouring vat-dyed fabrics and in discharge printing (DuP).
Snow Drop—Delusterant (FDI).
SOA—*Sucrose octa acetate.* Constituent of finishing agents (N).
Soapotol GAR—Wetting and penetrating agent; scouring and dyeing assistant (CO).
Solamidine—Direct dyes (JC).
Solantine—Direct fast dyes (NAC).
Solcastol—*Sulphonated castor oil.* Scouring agent; dyeing assistant (ACC).
Solcornol—*Sulphonated corn oil.* Scouring agent; dyeing assistant (ACC).
Solidogen—Aftertreating agent for direct dyes (G).
Solox—*Denatured alcohol.* Solvent (USI).
Solozone—*Sodium peroxide.* Bleaching and oxidizing agent (DuP).
Soluble Wax JB—Vegetable-wax finishing agent (JW).
Solucene—Softener and finishing agent (SC).
Solugel—Prepared gelatin used as a warp-sizing agent (SC).
Soluol—Softener and finishing agent (SC).
Soluol W—Olive oil softener used in conjunction with sizing agents (SC).
Solu wax—Emulsifiable wax used as a finishing agent (SC).
Solvent S-135—*Denatured alcohol and acetone mixture.* Solvent for cellulose acetate used in manufacture of fused collars (USI).
Solvent S-138—(See *Solvent S-135*).
Solvent S-139—(See *Solvent S-135*).
Solvent S-140—(See *Solvent S-135*).
Solvent S-144—(See *Solvent S-135*).
Soramine N—Softener and finishing agent (G).
Splash-Proof—Water repellent and spot-proofing agent (CAE).
Splashproof 5—Water repellent and spot-proofing agent (LS).
SRA—Acetate dyes (AAP) (CL).
Stabilizer 1—*Aromatic phenol.* Anti-oxidant and preservative for sizing and finishing compounds (GD).
Standapol 0—Softener for yarns and fabrics (SCP).
Standapol 15—(See *Standapol 0*).
Standapol 25—(See *Standapol 0*).
Standard Textile Oil—Wetting and penetrating agent; dyeing assistant (SS).
Stantex Waterproof—Water repellent and spot-proofing agent (SCP).
Star Brand Silicate—*Sodium silicate.* Bleaching assistant in peroxide bleaching (PQ).
Starbuck Gum—Finishing agent for hosiery and piece goods (PMC).
Stearamid—Brand of softeners, finishing compounds, and emulsifying agents (AD).
Stripper TS—*Titanous sulphate.* Stripping agent (AC).
Stripper Y—*Titanous sulphate.* Stripping agent (JW).
Sulanthrene—Vat dyes (DuP).
Sulfotol V-39—Sulphonated tallow-wax preparation. Finishing agent (HP).
Sulfanole—Detergent and scouring agent (W).
Sulfatate—Wetting and penetrating agent (GP).
Sulfoko—Throwing oil used with gelatin as a soaking agent for crepe (K).
Sul-Olive—*Sulphonated olive oil.* Dyeing assistant; finishing agent (SC).
Super-Size V-10—Warp-sizing agent for regenerated cellulose rayon (KP).
Supersulphate—Detergent and scouring agent (LS).
Supertex—*Vegetable gum.* Printing gum (JW).
Surpalite—Combined scouring and bleaching agent (SCC).
Supratol VF—*Highly sulphonated oil.* Finishing agent (HP).
Synthecin—Soaking agent for crepe; finishing agent (SC).
Synthogel—*Highly soluble gelatin.* Warp-sizing agent; soaking agent for crepe (MN).
Tetracarnit—Solvent for dyes; dispersing agent; dyeing assistant (S).
Tetrocele—Acetate dyes (U).
Tetrakierol-R—Scouring agent (OOC).
Tetramine—Direct dyes (U).
Tetrazo—Direct dyes (ADC).
Texavon—Scouring agent; bleaching assistant (ACC).
Tex-Dul 6—Delusterant (NOP).
Tex-Dul 8—Delusterant (NOP).
Tex-O-Dor—Deodorant used in finishing (GD).
Textile Escolite—*Sodium silico aluminate.* Detergent; scouring agent; bleaching and dyeing assistant (CD).
Textile Soda—Alkaline detergent used as a scouring agent for cellulose acetate (JBF).
Textolite Bleach—Chlorine bleaching agent (JW).
Texto XX—Detergent and scouring agent (TSC).
Thiotan MS—Mordant for basic and acid dyes (S).
Titanox A—*Titanium dioxide.* Delusterant (T).
Trianol—Direct dyes (CO).
Trianol Celco—Acetate dyes (CO).

KEY TO MANUFACTURERS' NAMES

A, Activin Corp.
AAP, American Aniline Products.
AC, Arkansas Co., Inc.
ACC, American Cyanamid & Chemical Corp.
AD, Amid Duron Co.
ADC, American Dyewood Co.
AL, Althouse Chemical Co.
ASW, Armour & Co.
BS, Borne Scrymser Co.
C, Ciba Co., Inc.
CAE, Carolina Aniline & Extract Co., Inc.
CAL, Calgon Inc.
CC, Carbic Color & Chemical Co.
CCC, Calco Chemical Co.
CCCC, Carbide & Carbon Chemicals Corp.
CCW, Cincinnati Chemical Works.
CD, Cowles Detergent Co.
CL, Celanese Corp. of America.
CO, Commonwealth Color & Chemical Co.
CPP, Colgate-Palmolive-Peet Co.
D, Dow Chemical Co.
DA, Dewey & Almy Chemical Co.
DCA, Dyestuffs Corp. of America.
DuP, E. I. du Pont de Nemours & Co., Inc.
EFH, E. F. Houghton & Co.
FDI, Fulton Dye & Import Co.
G, General Dyestuff Corp.
GC, Geigy Co.
GD, Givaudan-Delawanna, Inc.
GP, Glyco Products Co., Inc.
H, Halowax Corp.
HC, Heveatex Corp.
HI, Hygrolit, Inc.
HM, Heller & Merz.
HP, Hart Products Corp.
HPC, Hercules Powder Co.
HV, Herrick & Voigt.
IAC, Industrial Aniline & Chemical Co.
JBF, J. B. Ford Co.
JW, Jacques Wolf & Co.
JC, John Campbell & Co.
K, Kali Mfg. Co.
KP, Kem Products Co., Inc.
LS, Laurel Soap Mfg. Co., Inc.
M, Merck & Co., Inc.
MA, Mathieson Alkali Works.
MAC, Michigan Alkali Co.
MC, Monsanto Chemical Co.
MCC, Merrimac Chemical Co.
MD, Malt Diastase Co.
MEL, Melrose Chemical Co.
MN, Morningstar, Nicol, Inc.
N, Niacet Chemicals Corp.
NA, National Adhesives Corp.
NAC, National Aniline & Chemical Co., Inc.
NC, Nyanza Color & Chemical Co.
NG, Naugatuck Chemical Co.
NOP, National Oil Products Co.
O, Oakite Products Co.
OFZ, O. F. Zurn Co.
OOC, Onyx Oil & Chemical Co.
P, Protexall Co.
PCC, Peerless Color Co.
PDC, Poughkeepsie Dyestuff Corp.
PG, Procter & Gamble Co.
PhC, Pharma Chemical Corp.
PMC, Paper Makers Chemical Corp.
PP, Premier-Pabst Sales Corp.
PQ, Philadelphia Quartz Co.
RC, Revertex Corp. of America.
RCC, Royce Chemical Co.
Q, Quaker Chemical Products.
RH, Rohm & Haas Co., Inc.
S, Sandoz Chemical Works, Inc.
SB, Scholler Bros, Inc.
SBI, Standard Brands, Inc.
SC, Soluol Corp.
SCC, Surpass Chemical Co.
SCP, Standard Chemical Products, Inc.
SH, Stein, Hall & Co., Inc.
SIM, Simcoe Mfg. Co.
SS, Standard Soap Co.
T, Titanium Pigment Co., Inc.
TCP, Textile Chemical Products Co.
TL, Takamine Laboratories.
TSC, Texto Sales Corp.
TWD, Thomas W. Dunn Co.
UC, United Chemical Products Corp.
USC, Universal Solvents Corp.
USI, U. S. Industrial Chemical Co.
USO, U. S. Oil Co.
UST, United States Testing Co.
V, Vultex Chemical Co.
VS, Virginia Smelting Co.
W, Warwick Chemical Co.
WC, Wallerstein Co.
WP, Watson-Park Co.
Y, Young Aniline Works, Inc.
Z, Zinsser & Co., Inc.

Trigamine—*Polyhydric amino ester.* Emulsifying agent (GP).
Trisulfon—Direct dyes (S).
Triton B—*Tetra-substituted ammonium hydroxide.* Solvent for cellulose (RH).
Triton S 51—Detergent and scouring agent for use in alkaline, neutral, or acid solutions (RH).
Triton W30—Wetting and dispersing agent; dyeing assistant (RH).
Trocklin—Water repellent and spot-proofing agent (M).
Turpenol—Scouring agent (SCP).
Tytrovon—Detergent and scouring agent (M).
Ultravon C—Detergent; wetting, emulsifying, and scouring agent; dyeing assistant (C).
Ultravon W—(See *Ultravon C*).
Ultroil—*Sulphonated olive oil.* Dyeing assistant and softener (PMC).
Ultroil B—*Sulphonated castor oil soap.* Assistant in desulphuring; bleaching assistant; finishing agent (PMC).
Universal Mordant 9333—Chromium mordant (CC).
Uscopon—Stripping agent (USO).
Uscosol—*Sodium formaldehyde hydrosulphite.* Reducing agent used in discharge printing (USO)
Vasite—*Solution of zinc hydrosulphite partially stabilized with formaldehyde.* Stripping agent (VS).
Vaso—*Solution of zinc hydrosulphite-formaldehyde.* Stripping agent (VS).
Vat Gum 250—Printing gum (RCC).
Vat Gum NS—(See *Vat Gum 250*).
Vatrolite—*Sodium hydrosulphite.* Reducing agent used in vat dyeing; stripping agent (RCC).
Velvo Softener 25—*Sulphonated tallow.* Softener and finishing agent (RCC).
Velvo Softener 50—(See *Velvo Softener 25.*)
Velvoray 1—*Sulphonated olive oil.* Finishing agent (RCC).
Velvosheen—Softener and finishing agent (OOC).
Versicol—Finishing agent (BS).

Visco—Direct dyes (S).
Viscose—Direct dyes (DCA).
Vultex—*Vulcanized latex.* Combining agent; waterproofing compound, finishing compound for coated fabrics (V).
Warcolive—*Sulphonated olive oil.* Dyeing assistant and finishing agent (W).
Warco Soaking Oil—Soaking agent for crepe (W).
Warcosol—*Sodium alkyl naphthalene-sulphonate.* Wetting agent and dyeing assistant (W).
Warp-Size G—Warp-sizing agent (JW).
Warp Softener W 530—Tallow softener used in warp sizing.
Waterproof W-559—Water repellent (JW).
Wax 326—Finishing agent (KP).
Wetting Oil SF—Penetrating and wetting agent (ACC).
W Gum—Warp sizing agent for staple rayon (SH).
Wolfco Solvent—*Pine oil derivative.* Detergent and scouring agent (JW).
Wyandotte Caustic Soda—*Sodium hydroxide.* Alkaline detergent creping agent (MAC).
Wyandotte-KBX Flake—*Soda substitute.* Detergent and scouring agent (JBF).
Wyandotte Rayon Soda—*Modified anhydrous hydrocarbonate.* Scouring agent (JBF).
Wyandotte Soda Ash—*Sodium carbonate.* Alkaline detergent and scouring agent (MAC).
Wyteray—Delusterant (FDI).
Yarmor 302—*Steam-distilled pine oil.* Constituent of scouring compounds, delusterants, yarn lubricants, and dyeing assistants.
Yarnolene F 11—Yarn lubricant (HPC).

CLASSIFICATION BY TYPE OR USE

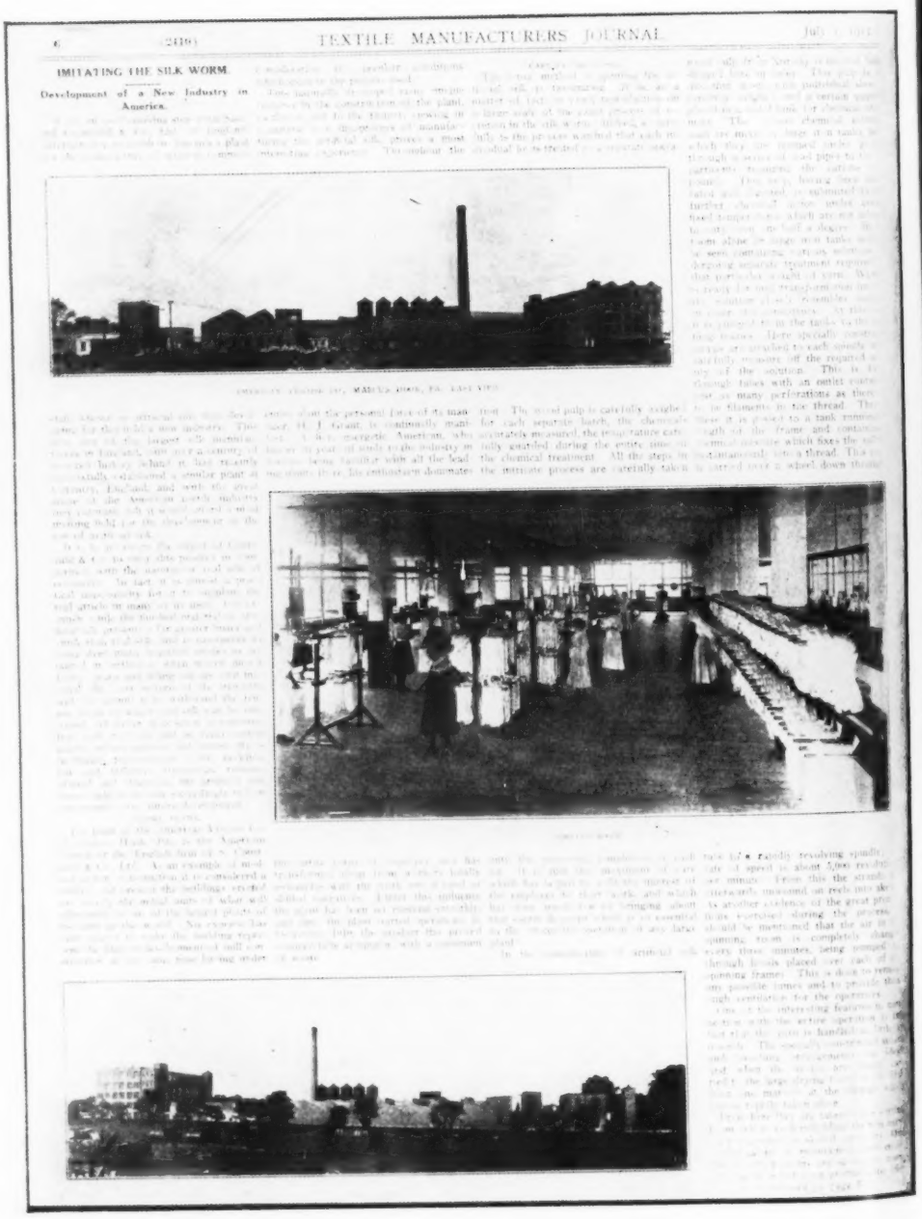
Acetate Dyes—Acetamine, Acetamine Diazo, Artisil, Calconese, Camacyl, Celanthrene, Cellitazol, Celliton, Celutate, Cibacete, Diacel, Monocel, Naccelan, Nyacet, Setacyl, Solocyl, SRA, Tetracele, Trianol Celco.
Aftertreating Agents—PAC, Sandofix, Solidogen.
Antifoaming Agents—Antifoam LF, Demino, Printogen.
Anti-Oxidants—Oxy-No-J, Stabilizer I.
Azoic Dyes—Cibanaphtols, Diagen, Naptha-nil, Naphthanil Diazo, Naphtol, Pharmasol, Pontagen.
Bleaching Agents—Aktivin, Albone C, H.T.H., Merclor, Merclor B, Nitrox, Solozone, Surpalite, Textolite Bleach.
Bleaching Assistants—(See also Wetting Agents)—PBL-Oil, Star Brand Silicate, Texavon, Textile Escolite, Ultroil B.
Conditioning Agents—Alkanol B, Alkanol SA, Brosco Rayon Oil T, Carbitol, Kinksettolit, Lubriknit, Meon, Quaker 404, Quaker 405, Quaker 407.
Delusterants—Antilustrole, Brosco Dull Finish, Delustran D, Delustran ST, Delustrant V-14, Delustrant V-45, Delustro, Diglycol Stearate, Dullatone-D, Dullatone L, Duller W, Dull Finish CSD, Dull Finish W-567B, Dull-Lustre, Dulstan, Dultex, Halowax 2017, Neotone T, Quaker TF 298, Snow Drop, Tex-Dul 6, Tex-Dul 8, Titanox A, Wyteray.
Deodorants—Tex-O-Dor.
Desizing Agents—Degomma 4 GS, Degomma 80 F, Diastafor BXR, Diastafor TP, Diastazyme, Diazonol HC, Digestase, Exsize, Polyzime P, Protozyme T, Rapidase, Seryzyme.
Detergents—(See Scouring Agents).
Developed Dyes—Amiclazo, Cindiazo, Diazine, Diazo, Dipyrazo, Nyagene, Pontamine Diazo.
Direct Dyes—Amidine, Amanil, Apomine, Artificial Silk, Benzanol, Benzo, Benzo Viscose, Calcodur, Calcomine, Chloramine, Chlorantine, Diamine, Diphenyl, Erie, Fastusol Formalide, Icyl, Niagara, Oxamine, Paranol, Pheno, Plutoform, Polyphenyl, Pontamine, Pontamine Fast, Printsols, Pyrazol Fast, Pyrazolon, Rayon, Rayonol, Rigan, Solamidine, Solantine, Tetramine, Tetrazo, Trianol, Trisulfon, Visco, Viscose.
Dispersing Agents—Alkanol S, Appretole 3-O, Daxad, Dispersine T, Neopen SS Pat., Oil 4-N, Sandozol KB, Tetracarnit.
Dyeing Assistants—(See Wetting Agents).
Emulsifying Agents—Amalgol, Arctic Syntex T, Avirol OS, Avirol WS, Deceresol OT, Diglycol Laurate, Gardinol LS Pat., Gardinol WA Pat., Igepon T, Invadine N, Nacconol KP, Nacconol KPR, Nilo TC, Oleo Glyceryl Sulphate, Trigamine, Ultravon C, Ultravon W.
Fiber Lubricants—(See also Yarn Lubricants)—Minerol.
Finishing Agents—Abopon, Aliphatic Ester Sulphate, Aquaresin, Aquasol, Avitex AD Pat., Avitex C Pat., Avitex SF Pat., Avitex W Pat., Bestowax, CC Softener, Ceranine S, Ceranine W, Chamosheen, CNH Finish, Concental, Cream Softener, Cream Softener JB, Finish KB, Finish NS, Finish WFS, Flexin P, Gum 122, Gum 260, Hartex Finish BX-9, Hartex Weighter, Hartex Weighter KF, Hevo Finishing Oil-128, Kapeco Paste, Klisol H-23, Luxosheen, Lustre White PW, Mellol 107, Mellol 175, Mel-O-Tex, Migasol PC, Monopole Oil, Morpeloil 426, No-Odorol, Nopcov, Nopco 1921-D, Oil 300, Oleo Glyceryl Sulphate, Onyxol ST, Palmito Glyceryl Sulphate, Parapon R, Parapon SA, Pergluton, Permanol N, Phosphamized Finishing Oils, Quaker Fin-O-Tex I, Quaker 412, Quaker Iso Gum, Rayon Crepe Softener, Rayonyxol F, Rayonyx Finish, RHonite Powder 611, RHonite Solution 414, Ruxite, Sandozol KB, Sapamine FL, Sapamine KW, SC Softener, Silco Softener, Silk Finishing Oil R, Silk-O-Fast A, Silk-O-Fast B, SOA, Soluble Wax JB, Solucene, Soluol, Soluol W, Soluwax, Soramine N, Standapol O, Standapol 15, Standapol 125, Starbuck Gum, Stearamid, Sulfotol V-39, Sul-Olive, Supratol VF, Synthecin, Ultroil, Velvo Softener 25, Velvo Softener 50, Velvoray I, Velvosheen, Versieol, Warcolive, Wax 326.
Flameproofing Agents—Abopon.
Knitting Oils—(See Yarn Lubricants).
Latex—Heveatex, Lotol, Revertex, Vultex.
Mildew Preventives—Hydrosol, Nopco 1545, PAC, Shirlan A, Shirlan D, Shirlan Extra.
Mordants—Carbierome BS, Katanol, Thiotan MS, Universal Mordant 933.
Penetrants—(See Wetting Agents).
Printing Assistants—(See also Wetting Agents)—Aliphatic Ester Sulphate, Alkanol S, Liovatine S, Penetrall.
Printing Gums and Thickeners—Diglycol Stearate, Fabritex 5, Hevo-Gum, Hevtex Vat Gum 55, Mikah, Supertex, Vat Gum 250, Vat Gum NS.
Protective Agents—Albatex BD, Revatol S, Sitol.
Reducing Agents—(See also Stripping Agents)—Arostit RFL, Arostit ZET, Discolite, Esotoo, Formopom, Hydrite, Hydrosulfite AW, Hydrosulfite AWC, Lykopon, Reducin NS, Reducin S, Rongalite C, Rongalite CL, Uscosol, Vatrolite.
Scouring Agents—Akcocene, Aktivin, Amzo 1 R, Amalgol, Arctic Syntex T, Areskap, Blancal, Carosolv ML, Castopole, Castrolite, Cel-Ray Scourer, Diazonal AC, Esco Savon, Exol, Fiberite, Gardinol LS Pat., Gardinol WA Pat., Hartex Oil K-40, Hydraphtal Pat., Hydroxy Art Silk Boil-Off Oil, Igepon T, Kemopene 207, Loupole W-950, Metso, Morpel Oil-407, Nacconol KP, Nacconol KPR, Nopco 1545, Nutrosan FEM, Oakite, Olivesco, Oratol, Palmito Glyceryl Sulphate, Penotex, Rayon Scour A, Rayonyx Scourer OB, Rayscour A, Rayscour B, Rinfors L, Scouring Oil 245, Solcastol, Solcornol, Sulfanole, Supersulfate, Surpalite, Tetrakierol-R, Texavon, Textile Escolite, Textile Soda, Texto XX, Triton S 51, Turpenol, Tytrovon, Ultravon C, Ultravon W, Wolfco Solvent, Wyandotte Caustic Soda, Wyandotte KBX Flake, Wyandotte Rayon Soda, Wyandotte Soda Ash, Yarmor 302, Celascour.
Skein-Sizing Agents—(See also Soaking Agents)—Sanitose H., Sanitose S.
Soaking Agents—Crepe Gum Filler, Duntex (40 to 500), Hartex Rayon Oil V-69, Hydroxcene, Kali Gel 3, Laureltex C, Morepeloil 303, Nopco 111, Nopco Size 1, Nopco Size 2, Oil 300, Pacol 5, Rayogel C, Rayspin Compound A, Rayspinol 6-W, Sulfoko, Synthecin, Synthogel, Watco Soaking Oil.
Soaps—Arctic Olive Oil Soap, Certified Flakes 718, Formula 10, Ivory Chips, Olate, Olive Flakes 735.
Softeners—(See Finishing Agents).
Solubilizing Agents—Aktivin S, Arcy.
Solvents—Carbitol, Cellosolve, Pent-Lev XXX, Solox, Solvent S-135, Solvent S-138, Solvent S-139, Solvent S-140, Solvent S-144, Tetracarnit
Solvents for Cellulose—Triton B.
Splashproofing Agents—(See Water Repellents).
Spot-Proofing Agents—(See Water Repellents).
Spotting Agents—Benzine Soap S-263A, Cellosolve, Silvatol I.
Stripping Agents—(See also Reducing Agents)—Aktivin, Albatex P O, Amaldehyde, Decrolin, Dystrip, Humectol, Hydraldehyde, Protolin W, Reductone B, Stripper TS, Stripper Y, Uscopon, Vasite, Vaso, Vatrolite.
Throwsters' Tints—(See also Dyes)—Ameran, Celatints, Certified Throwster Tints.
Twist-Setting Agents—(See Conditioning Agents).
Vat Dyes—Algol, Amanthrene, Calcoloid, Calcosol, Carbanthrene, Cibanone, Hydroform, Indanthren, Indigosol, Leucosol, Midland, Ponsol, Sulfanthrene.
Warp-Sizing Agents—Acetole Size, Arkogal, Celogel, Dunntex 25, Elastine, Elast Mix, Hartex Size HF, Hartogel K, Houghto-Size AC, Hydroxy Acetate Size 15, Hydroxy French Size, Hydroxy Size 3, Mellol-220, Mikah, Morpelene Acetate Size Bricks, Morpelene Rayon Size Bricks, Quaker 475, Quaker Iso Gum, Raygomm T, Raygomm 92, Raygomm 306 T, Raygomm NCA/NF, Raylubric 100, Solugel, Super-Size V-10, Synthogel, Warp Size G, Warp Softener W530, W Gum.
Waterproofing Agents—(See Latex and Water Repellents).
Water Repellents—(See also Latex)—Aquarol, Aquatex, Aridex WP, Cerol S, Cerol T, Cerol TFS, Cohansey Waterproofing compound, Dry-Tex-Ol, Finishing Compound AR, Finishing Compound HR, Hydroxy K-7-F, Impregnole, Migasol PC, Migasol PJ, Nopco ATO, Protexall, Quaker Fin-O-Tex 60, Ramasit, Splash-Proof, Splash-Proof 5, Stantex Waterproof, Trocklin, Waterproof W-559.
Water Softeners—Calox Crystals, Calgon.
Weaving Assistant—Hydrogenated Waxsticks.
Weighting Agents—(See Finishing Agents).
Wetting Agents—Akoil 1-4-3, Albatex PO, Aliphatic Ester Sulphate, Alkanol B, Alkanol M-48, Alkanol M-60, Alkanol SA, Amalgol, Amiduroil, Aquasol, Arctic Syntex T, Areskap, Aresket, Avirol AH Ex, Avitex AD Pat., Castopole, Castrolite, Cellosolve, Cominol GAR, Deceresol OT, Diglycol Laurate, Dye Penetrator R, Gardinol WA Pat., Hartex Oil K-40, Hartopene K, Hydraphtal Pat., Hydrosol, Hydroxy M Oil, Igepon T, Immersol TX, Invadine N, Kalpinol 1, Kemopene 207, Kemopole, Mercerol, Monopole Oil, Morpeloil-407, Moytol, Nacconol KP, Nacconol KPR, Nekal A, Nekal BX, Neomerpin N, Neomerpin VD Pat., Neopen SS Pat., Nopcov, Nopco 1545, Nutrosan FEM, Oil 4-N, Oleo Glyceryl Sulphate, Oratol, Parapon SA, Penetrall, Penetrol, Penotex, Pentasicon, Pent-Lev XXX, Peregal O, Permeko, Prestabit Oil, Pyrotex, Quaker 412, Radiactine, Resolin NF, Sandocarnit, Sandozol KB, Sandozol N, Sapamine KW, Soapatol GAR, Solcastol, Solcornal, Standard Textile Oil, Sulfatate, Sul-Olive, Tetracarnit, Triton W30, Ultravon C, Ultravon W, Ultroil, Ultroil B, Warcolive, Warcosol, Wetting Oil SF, Yarmor 302.
Yarn Lubricants—Celax, Hydroxy Rayon Oil 6W, Hydroxy Rayon Oil B-C, Hydroxy Rayon Oil 6-5, Hydroxy Rayon Oil 118, Lubriknit, Minerol, Morpeloil-732, Morpeloil-735, Nopco 1556, Nopco 1762, Nopco 1887, Quaker 407, Quaker 415, Rayon Oil 19A, Rayon Oil 999, Ruxite, Yarnolene F11.

TEXTILE WORLD'S CONTRIBUTION

To the progress
of the
American Rayon Industry

IN the growth of a new industry, the progress of its literature is an important factor. Consequently we shall try to set down —as objectively as we can under the circumstances—the part which TEXTILE WORLD has played in the first quarter-century of the American rayon industry.

It got away to an early start. In the July 1, 1911, issue of *Textile Manufacturers Journal* (which merged with *Textile World Record* in 1915 to form TEXTILE WORLD) we find a two-page article describing the plant of the American Viscose


IMITATING THE SILK WORM.

Development of a New Industry in America.

TEXTILE MANUFACTURERS JOURNAL

Co. at Marcus Hook. Apparently the editors were thoroughly alive to the significance of the event. The article concludes with this prophetic statement:

"Its (artificial silk's) uses are so varied that it has already won its permanent place among American industries, and while still in its infancy it is fair to predict that it will play a great part in the future development of American textiles."

To that visionary editor of 1911, we say in 1936: And how!

We reproduce this early record herewith.

The next major evidence of TEXTILE WORLD's participation in the new industry coincided with the start of the impetus, in 1920, which led to the real growth of rayon. In its 1921 Annual Number, this publication gave feature treatment to the 1920 events in artificial silk manufacture—recording the activities of individual companies and interpreting their significance. This was the start of a custom. Each "Annual" thereafter carried statistics on production, recognized as authoritative.

In 1925, another step was taken when a special Rayon Year Book Number was published; this present issue is the 12th annual one of that series.

Tangible evidence of the job done was supplied in 1930 when the 1928-29 Associated Business Papers Medal for Outstanding Editorial Service was awarded to TEXTILE WORLD for its contribution toward the expansion and success of the rayon industry. Specifically, the award recognized the technical articles which played such an important part in developing a rayon technique; the "Questions and Answers" which gave help to hundreds of men in the industry on their specific problems, enabling them to overcome discouragement and to improve the quality of rayon products; and the active participation in the form of contacts with associations, laboratories, rayon producers, rayon users, and equipment manufacturers.

When the medal was presented publicly to TEXTILE WORLD, it was stated by the chairman of the Jury of Awards that the jury was impressed with the fact that the rayon service which won the award was a continuing service and that the efforts of the publication in this direction would undoubtedly be a feature of its program for some time to come.

It was also remarked that significance lay in the fact that the medal was awarded for work in the adaptation of an old industry to new conditions, namely, the invasion of a new textile fiber—"a consideration so vital in these days of constant readjustment in business and industry."

That's a good place to stop.

July 2, 1911 TEXTILE MANUFACTURERS JOURNAL. (2111) 37

IMITATING THE SILK WORM.

(Continued from page 6.)

PREDICTS MARKED CHANGE.

Optimistic View of Factor in Finishing Industry Regarding Near Future.

MISCELLANEOUS.

1911's "Thread of Candy" Becomes 1936's

MOST VERSATILE FIBER

195 QUESTIONS AND ANSWERS 819

69 + 34 (2 per cent.) = 7.04 grams.
7.04 (grams) ÷ 20 (grams) = 35 per cent. of cotton.
100 per cent. — 35 per cent. = 65 per cent. of wool.

ARTIFICIAL SILK

Editor Textile World Record:

We would like to know what the enclosed fiber is. We want to use this in place of silk, but we find it has not the same nature. Where does this fiber originate?

Claude (Md.).

The sample of fiber sent is artificial silk, the original process for the manufacture of which was invented by Count H. de Chardonnet, and first exhibited by him at the Paris Exposition of 1889. There are now several processes for the manufacture of this textile substance, and I am informed that a score or more of manufacturers in the United States are using it more or less in their product. Of course it is not silk at all (i. e., animal fiber), but is produced from vegetable cellulose, such as pure cotton fiber. It is claimed to be as elastic as natural silk, but its real elasticity is only about 4 or 5 per cent. As to strength, a square meter of artificial silk will stand a breaking strain of 25 to 35 kilograms. Raw silk will break at 30 to 45 kilograms. Naturally, not being as strong as real silk, and less elastic, it has not the wearing qualities of the animal fiber. In density, artificial silk rates at about 1.49, coming between that of natural raw silk at 1.66, and natural boiled silk at 1.25. In luster and brilliancy it is claimed to be the equal of the natural product. Mr. Leyster H. Dewey states that it may serve an excellent purpose in the manufacture of stockings for incandescent gas mantles—as well as for purposes where the material is not subjected to severe conditions of wear, and not likely to come in contact with moisture; for some forms are said to melt under certain conditions of moisture very much like a thread of candy. In its early manufacture, under the Chardonnet process, starting with paper pulp—or pure cellulose—the chemical treatment transformed it into pyroxyloid, or gun cotton—and made it inflammable to a high degree. A process of denitrification became necessary to prevent the manufactured fabric from going up in smoke.

TESTING GREASE WOOL

Editor Textile World Record:

Please give me information regarding the method of testing greasy wool to determine its shrinkage as practiced in French conditioning houses.

Sanborn (Md.).

This inquiry was referred to our French correspondent who replies as follows:

Grease wool is rarely conditioned. A sample of about 2 pounds is drawn from the lot. This is obtained by drawing small portions from a number of bales. These samples are taken from the fleeces on the outside of some of the bales and on the inside of others. Naturally it is necessary to draw the sample from different parts of the fleece. In testing large lots it is necessary to take the average of two or even three samples. The test sample thus obtained is weighed in grains. It is then scoured by the following process.

1. Washing in a solution of Marseilles soap at 120° F.

2. Rinsing in water at 86° F. The wool should be a clear white after this rinsing. The duration of the operations varies greatly, depending upon the condition of the wool.

3. Washing in a 1 to 2 per cent. solution of hydrochloric acid at a temperature of 120° F.

4. Rinsing in a 5 to 6 per cent. solution of carbonate of lime at a temperature of 120° F.

5. Rinsing in a solution of acetic acid at 80° F. After squeezing the water out by hand the sample is placed in an ordinary Persiz conditioning oven. The temperature

IN the "Questions & Answers" column reproduced above from the May, 1912, issue of *Textile World Record*, an inquirer who had submitted a sample of an unfamiliar fiber was answered thus:

> **"The sample is artificial silk. . . . It may serve an excellent purpose . . . where the material is not subjected to severe conditions of wear and not likely to come in contact with moisture; for some forms are said to melt under certain conditions of moisture very much like a thread of candy."**

In the book, "Textiles and Clothing," written in 1934 by McGowan and Waite, who view fabrics with the practical eye of rayon's supreme judge—the woman, we read:

> **"No one need hesitate in selecting synthetic fabrics for under- or outerwear or stockings, on the score of whether they will cleanse well. . . . They may clothe us completely, even to slippers and hats; they provide us with sports wear and evening dresses; furnish blankets, sheets, and bedspreads, draperies and upholsteries, cushions and lamp shades for our homes; combinations with linen for our dining tables; automobile robes for our cars and covers for the cushions of these cars; and they may be found in cobwebby laces as well as in the heaviest of carpet material."**

These two quotations show how lightly rayon was held in the early days of its commercial production in this country and how it has risen in esteem during the intervening years.

Evolution of Physical Properties of Viscose Type Rayons
(Compiled from Published Data)

Authority and Date	Strength (g./den.) Dry	Strength (g./den.) Wet	Elongation (Percent) Dry
1901, Strehlenert (Quoted by Becker, "Die Kunstseide," 1912)	0.83	0.25	——
1907, Courtaulds, Ltd. (Quoted by Shearer and Hegan in paper before Inst. of Rubber Ind., England, 1936)	1.10	0.35	15
1912, Cross & Bevan (Quoted by Becker, "Die Kunstseide," 1912)	1.2	——	15
1926, Nat. Assoc. Cotton Mfrs. (Bulletin Nos. 77, 78, and 80, 1926)	1.21	——	19
1928, Wheeler ("The Manufacture of Artificial Silk," 1928)	1.37	0.64	22
1935, Saxl (Schwarz and Mauersberger, "Rayon and Synthetic Yarn Handbook," 2nd. Ed., 1935)	2.09	0.91	17
1935, Courtaulds, Ltd. (Quoted by Shearer and Hegan)	2.1	1.1	20

By Harold DeWitt Smith, Ch.E., Ph.D., F.T.I.
Textile Technologist,
A. M. Tenney Associates, Inc.

WHAT have been the steps and the means by which the world's chemists, engineers, and textile technicians have brought artificial silk from the state of a "thread of candy," at the time when production in the United States was just undertaken, to the sturdy, versatile, ubiquitous textile material of the present day? The answer to this question is a dramatic story of technical progress.

The 25 years under review have brought no change in the sources of the raw material. Then, as now, cellulose was the base of the commercially successful fibers and then, as now, cotton and wood pulp were the only commercially practicable sources of cellulose. The intervening years have seen the successful use of other cellulose sources, such as sugar cane and corn stalks, on a laboratory scale, but these materials have not been able to compete with respect to cost of the purified cellulose and the availability of sufficient uniform supply.

In the early days, cotton was purchased raw and scoured and bleached in the rayon plant. Early sources of wood pulp were the highest grades of sulphite pulp for paper making which were available at that time.

The long-staple cotton which was used as a raw material for rayon and synthetic yarns in the early days of the industry has given way to the more economical and equally suitable linters, or short hairs, which are removed from the cotton seeds after ginning and before pressing them for oil. The manufacturer of acetate, viscose, or cuprammonium yarn now buys bleached linters from companies which prepare them according to strict specifications and furnish analyses and spinning tests made in their own plants on each lot of linters as processed.

Today, the makers of chemical pulp from wood also have research and control laboratories and even semi-commercial rayon spinning units for testing the quality and the performance of their pulps. This enables them to deliver a very uniformly high grade of this material in sheet form to the rayon maker.

L. Hebbs, of the firm of Cross & Bevan, has recently recounted the progress made throughout the world in preparing chemical pulp from wood which will be of such purity and properties

as to make it suitable for cuprammonium and acetate yarns, which have heretofore been made exclusively from cotton linters.

The most significant recent development in the field of raw materials is undoubtedly the production of high-grade pulps from southern slash pine at Atlanta, Georgia, under the direction of Dr. Charles Herty. Analyses of this pulp have shown it to compare very favorably with the present regular supply from northern spruce, and experimental quantities of rayon have already been made in rayon plants. The rate of growth of slash pine is said to be rapid enough to provide a perpetual annual supply sufficient not only for the rayon industry, but for the entire world consumption of cellulose pulp. Hence, the successful introduction of this source of raw material for rayon should certainly insure a stable, cheap, raw material for the industry and make very unlikely the utilization of any sources other than wood and cotton.

Production Methods

As with raw materials, so with production methods; in general procedure, there has been relatively little radical change during the quarter century under review.

The viscose process which was used by the first commercially successful plant in the United States, beginning in 1911, was utilizing at that time not only the xanthate method of getting cellulose into solution, as invented by Cross and Bevan, in 1892, but also both the bobbin and the pot, or centrifugal, methods of spinning which are being used in the present-day viscose plants throughout the world.

The nitrocellulose process, which was in full bloom in Europe by 1911, was first introduced into the United States in 1920 and was conducted in accordance with the principles laid down in Chardonnet's original patents until 1934, when the only domestic plant utilizing this process (and the last but one in the world) was dismantled.

A few years after the beginning of the period under consideration, the process of Mork, Little, and Walker for making acetate yarn by wet spinning a chloroform solution of cellulose triacetate into organic liquids was put into commercial production. This product, known as Lustron, disappeared from the market because of the combined weight of manufacturing and dyeing difficulties. At the end of the War, the utilization of acetone-soluble cellulose acetate by dry spinning this solution into a current of warm air inaugurated the acetate process which today is being carried out successfully on this same principle all over the world.

The cuprammonium process had passed through many viscissitudes before 1911; and the stretch spinning process of Thiele, on which present operations are based, was already in use. Commercial production of cuprammonium yarn in the United States dates from 1926.

Technical progress in rayon manufacture in last quarter century is dramatic story

Probably, the most radical innovation in spinning and processing machines since these four processes were established is the machine for the continuous spinning, treating, washing, drying, and packaging of cuprammonium yarn, which was invented by Furness in this country in 1931. While the progress made by this machine has been much slower than was first predicted, the original plant is still in operation. The interest of other rayon companies in this machine, as well as the subsequent appearance of a number of patents for continuous spinning and processing machines, indicate that this idea which, like many others, seems to be slow in gathering momentum may take an important place in the industry during the next quarter century.

The chief progress in manufacturing has been not in methods, but in refinements and in the economics of operations. The steps in the preparation of the spinning solution have been rationalized and the machinery has been simplified in design. The spinning pot assembly has been developed in speed, in resistance to corrosion, and in dependability and life. The spinning pump has evolved into a precision meter of the highest and most dependable type. Aftertreatment of viscose and cuprammonium yarns has been mechanized and standardized. Control of temperature, concentration, and circulation of solutions, and of temperature, flow, and moisture content of air has been brought to a point of precision which is equalled by few industries.

The engineer has developed these refinements in manufacturing methods to keep pace with the improvements in materials which the chemist has accomplished, and this cooperative effort has given the textile technician better and better yarns with which to work.

Yarn Properties

Needless to say, the growth in the consumption of rayon and other synthetic fibers, which is evidenced by the statements previously quoted and by the statistics presented elsewhere in this issue, could only have been based on the constant improvement of the yarns in all their properties.

Strength, resistance to moisture, uniformity of dyeing, suppleness, fineness, luster—all these qualities have been bettered as the years passed. The best evidence of this progress is the appearance and the feel of actual fabrics of years ago and of today. But some measure of the progress may be obtained by the following comparisons:

Filament size—The silkworm spins a filament the size of which after boiling off the surrounding gum averages 1.35 denier. Careful sericulture has brought the coarser filaments of the original wild silkworms down to the average fineness, which has been available for many years.

In 1911, Viscose Co. opened its plant with the production of 150-denier, 12-filament yarn. Hence, the denier of the single filament was 12.5. By 1926, the filament count of this size yarn had risen to 24 filaments, and hence a filament size of 6.2 denier.

Today, the common structure is 60 filaments (2.5 denier per filament), and yarns of 150 filaments (1 denier per filament) are being made and used commercially. A similar evolution toward finer filaments has occurred in acetate yarns. Cuprammonium yarns have always been spun in filaments approximating the size of silk (1.35 denier per filament).

When we consider the fact that the stiffness, or rigidity, of a rod or filament of given shape and material varies as the cube of its diameter, the enormous effect of this evolution toward finer filaments on softness, suppleness, drape, and creasability is at once apparent. Based on this relationship, the filaments of the 150-denier, 12-filament yarns of 1911 were 11 times as stiff as those in the 150-denier, 60-filament yarns of today, and 44 times as stiff as those in the present 150-denier, 150-filament yarns.

Denier of yarns—In 1911, all of the yarn used in this country was 150-denier or coarser. By 1923, 120-denier viscose yarn was being made, and nitrate yarns as fine as 45-or 50-denier were available in small quantities. By 1931, 16% of the domestic production was finer than 150-denier and, in 1934, the production of deniers finer than 150-denier had risen to 32% of the total produced in that year. The deniers offered by domestic manufacturers of all types range at present from 15-denier to 1,200-denier.

Strength and elongation—Published data on the strength and elongation of rayon and synthetic yarns are not very plentiful and those which are available are difficult to correlate, not only be-

cause of the change in testing technique as the industry developed from infancy to maturity, but also because of the present differences in test methods from one laboratory to another. Actual results obtained vary with such factors as the moisture content of the yarn tested, the capacity of the testing machine, and the rate at which the load is applied. Standard test methods, though available, are not always used. Nevertheless, the table on page 114 has been compiled from references to viscose yarn found in the literature, starting with tests made by Strehlenert (Germany) in 1901, in order to illustrate the general improvement in the strength of man-made fibers since the beginning of the century.

A similar record of progress over a shorter period is provided in the table published in TEXTILE WORLD for September, 1933, which shows that the annual average tensile strength of the 150-denier viscose rayon of one large producer rose from 1.50 grams per denier dry and 0.48 grams per denier wet in 1920 to 2.00 grams per denier dry and 0.95 grams per denier wet in 1932.

For comparison, it is interesting to note that the strength of boiled-off silk as given by a number of the authorities cited in the table (and therefore tested by the same method) including Strehlenert, Wheeler, and Saxl, varies from 2.07 to 2.5 grams per denier dry and from 1.10 to 2.0 grams per denier wet. It is apparent that the strength of present-day rayon approaches that of silk. Furthermore, according to Shearer and Hegan, rayons have been made for special purposes with strengths ranging from 3 grams per denier to as high as 4.8 grams per denier, thus illustrating again the versatility which these synthetic fibers have attained.

While viscose yarn has been used to illustrate the progress which has been made in physical properties, the other types have also shown a steady improvement in this respect.

Luster—Before 1928, all of the rayon and synthetic yarns were "bright," or lustrous, and this glossy luster which had first made them attractive to braiders, to knitters, and to weavers of satins and other glossy fabrics was preventing their acceptance in those types of fabrics in which a less lustrous appearance is desired. In that year, the viscose manufacturers inaugurated a fundamental change, which has proved to be of far-reaching importance to the industry, by introducing a finely divided oily constituent into the spinning solution. The yarns spun from this solution were subdued in luster and of the type generally known as semi-dull. The next step in this development was the introduction, in 1929, of a small amount of titanium oxide pigment into the nitrocellulose type of yarn, which resulted in a dull, chalky white appearance quite different from that of any rayon which had been previously produced. By 1931, the practice of pigmentation had spread to acetate and to viscose yarns, and today, both dull- and bright-luster yarns are produced by every manufacturer of importance. Use of dull-luster yarns has enabled fabric designers to produce new textures which cannot be approached for permanent dullness by any natural fiber.

Future Trends

Although the manufacture of staple fiber by cutting up continuous-filament rayon was first patented in 1909, it is mentioned here as a future trend because its acceptance has been slow and because, despite the rapid increase in its importance during the last two years, it still stands on the threshold of a development which will be as far-reaching and as spectacular as was that of the continuous-filament yarns during the last 25 years.

The lack of strength and the limp, raggy nature of yarns which were spun from the earlier types of cut staple were undoubtedly among the chief factors delaying their development. The present rapid increase in the consumption of this form of man-made fibers has been due in part to the recent improvement in physical properties and in part to the effort in foreign countries to develop substitutes for the natural fibers which those countries have to import. The result has been experimentation on a grand scale. Viscose, cuprammonium, and acetate staple have been used alone and in blends with cotton, flax, wool, or silk. Fibers with deniers ranging from 1.5 to 20 denier have been produced. Out of this recent development have already come some fabrics of great value from both the practical and the aesthetic viewpoints, and out of it are coming new methods of processing the man-made staple fibers for specific purposes and new textures in such fields as men's suitings, shirtings, draperies and upholstery, in which the continuous-filament yarns, despite their versatility, have not made the progress that they have in other directions.

Materials other than cellulose have been proposed for the production of synthetic yarns, and some of these have attained commercial production. In the early years of the quarter century under review, "gelatin silk" was available, but its low strength and sensitivity to water soon swept it from the market. Many patents and processes have appeared for dissolving waste silk and extruding it into continuous filaments, but this "artificial real silk" has never attained commercial production. Chitin, which is available in considerable quantities in the shells of certain insects and of certain shell fish, has been converted into textile filaments which never got beyond the laboratory.

At present, glass and casein hold the center of the stage as innovations. For glass fibers, there are undoubtedly fields which will be conquered, such as for filtering, for insulation, and for fireproofing, where its chemical stability and inertness will be of distinct value, but glass and man-made cellulose fibers will never compete to any great extent in the same markets.

The casein fiber is still an unknown quantity. Its progress so far has been more rapid than was that of rayon at a corresponding period of its history. Whether or not it can be developed in strength, in elasticity, and in durability to the point where it will no longer be considered as a substitute for wool, but as a new fiber with distinctive merits of its own, as has rayon, remains to be seen. Among the obstacles which it must overcome, the rapidly developing cellulose staple fibers loom large, for these reasons: The available perpetual supply of cheap raw materials for conversion into cellulose fibers is unlimited. The properties of these cellulose fibers can be modified by esterification to produce desirable heat and electrical insulating qualities, and by impregnation with synthetic resins to produce elasticity and crease resistance. They can be made in any fiber diameter, in any length, in any color, in any luster; smoother than silk, or as crinkly as wool. Thus, in versatility and in economy of production, the cellulose fibers are becoming firmly established in the field which casein fibers seek to enter.

On the other hand, the casein fiber is a protein and thus its properties differ in some interesting respects from those of cellulose materials. Furthermore, judging from its superiority over gelatin and other protein substances as a permanent, waterproof glue, and from its successful use as a molding plastic, casein seems to be more suitable for conversion into stable and resistant forms than are any of the other soluble proteins. While it lacks the complex and remarkable molecular structure which gives wool such properties as elasticity, both dry and wet, and felting power, it is certainly more closely related to wool than was rayon to the silk which first served as its model. Hence, concentrated effort and research in the years ahead may well develop casein fiber into a material which will take its place in the synthetic fiber field beside the family of cellulose fibers.

The immediate future, however, will reveal the continued advance of the cellulosic fibers by the gradual improvement in their properties and the diversification of their forms and, above all, by the increasing ingenuity and skill of the textile designer and technician in converting these man-made fibers into an ever-widening range of fabrics.

THEY WANTED TO KNOW...

History written in 25 years of Textile World's questions and answers on rayon matters

We needed some convenient way to trace the experiences of practical mill men in handling rayon over the last 25 years, and we discovered that there is no better guide than our own Questions and Answers Department. Accompanying abstracts show with great clarity the travail of the superintendents and overseers who struggled heroically with the strange new substance and brought it through to be one of the dominant textile raw materials of today.

IT was not until 1912 that the first inquiries on the technique of handling rayon in the textile mill proper began to arrive in our mail box—or at least the first inquiries that we were able to answer with enough confidence to warrant our publishing the replies. We naturally lacked information and sources of it as much as anyone else at first. But in the March issue of that year our Questions and Answers columns blossomed forth with their first two technical inquiries on "artificial silk." The first of these (the 1,995th question and answer on any subject we had published) asked for advice on—well you could probably guess easily—winding.

"And Can They Be Washed?"

"We are knitting artificial-silk neck scarfs," the inquirer said in effect. "How can we wind in a manner that will reduce the excessive waste we now experience?" For good measure, he threw in another timely inquiry at the end: "Can our garments be washed?"

"By 'artificial silk'," we began, "it is presumed that you refer to what is called 'wood' or 'fiber' silk. (We were pretty shrewd in those days, you will note, and could see through the disguise.) This class of silk is used with very good results on 12-gage machines for making neckwear. . . . The best results are obtained by getting the silk twisted first to the required size and then wound from skeins on a bobbin winding machine which has scrapers to catch the knots, lint, and dirt. . . . It has been found that fiber silk can be washed with very satisfactory results." Right away, you see, we were optimistic about the new fiber.

The other rayon inquiry published in that March, 1912, issue—the 1,999th question printed in TEXTILE WORLD—asked how artificial silk is numbered. "By the denier system," said we, in part, "which is as old as the silk industry."

Next month—April—we apologized for a misprint in the figure for yards per pound of a No. 1 denier yarn in the latter reply. It should be 4,442,112 yd., we said; but we pointed out that "one of the many metric congresses" in Europe had adopted "½ decigram per 450 meters, which is equivalent to 4,464,601 yd. per pound." Today the figure employed is 4,464,528.

In May appeared an inquiry which was probably typical of the time: "We would like to know what the inclosed fiber is," it read. "We want to use this in place of silk, but we find it has not the same nature. Where does this fiber originate?"

Melts Like Candy

The reply identified the fiber as the artificial silk invented by Chardonnet. "There are now several processes for the manufacture of this textile substance," it continued. "A score or more of manufacturers in the United States are using it to some extent in their product. . . . Naturally, not being so strong as real silk, and less elastic, it has not the wearing qualities of the animal fiber. . . . It may serve an excellent purpose in the manufacture of stockings for incandescent gas mantles — as well as for purposes where the material is not subjected to severe conditions of wear and not likely to come in contact with moisture. Some forms are said to melt under certain conditions of moisture very much like a thread of candy."

We were quite free from all these plaguy inquiries—about a new material in which so few of our readers were interested anyway—until April, 1913, when a dyer wanted to know whether cotton and artificial silk could be cross-dyed. "There is no method now known," we declared—unless one or the other of the yarns is first treated in some way, we added in a later issue.

The finishing of artificial silk embroidery was the next problem presented, and that was not until August, 1913: "We make this dress trimming with a natural-silk back and an artificial-silk embroidery. . . . Can you give me directions for destroying the natural silk without affecting the color of the artificial silk?" With remarkable resourcefulness, we recommended that the inquirer refrain from coloring the goods until after the silk had been destroyed.

The first of what later became a familiar class of inquiries appeared in September: "Is there any way of softening the yarn? What is the best way to run this yarn for making hosiery?"

Knitting manufacturers had tried soaking the silk in a thorium bath, the reply stated, but "the yarn became much more difficult to work, the thread breaking frequently, and the danger of fire was greatly increased." Better, we added, to knit with positively driven feed rolls and with sinker heads in order that tension might be low and uniform. A few issues later, in a supplementary reply, we recommended running the silk over oiled pieces of cloth on the knitting machine, mainly to lubricate the needles. We also recommended small cones, stop motions for knots, and slow running speeds.

In October: "A great deal of time is lost by the stopping of machines during damp and rainy weather, the moisture having a tendency to weaken the filament." What to do?—Regulate the room humidity was our advice.

An inquiry on waste which perhaps heralded the first stirrings of the rayon

staple industry, now looming ahead of us as the next great development in textile manufacture, was published in January, 1914: "Please give me some information on the manufacture of artificial-silk fabrics from garnetted yarns."

We offered the following information in reply: "This material is being somewhat largely used in Germany for mixing with wool to make dress goods. The artificial silk refuses the wool dye and gives a brilliant effect upon the darker background. . . . There is an increasing production of this form of waste."

In July of the same year a reader wanted to know where he could buy machines for producing rayon. He was referred to M. Hermann, Krefeld, Germany.

"Enclosed is a piece of hosiery," wrote an inquirer in the October issue. "The white portion is mercerized cotton, the brown part is plated with French artificial silk. Is it possible to make a uniform shade of any color on hosiery of this kind?" Yes, it is possible, we said, and we explained at length how to do it.

There was another inquiry on artificial silk waste—specifically on its uses—in November. Reply: "After being garnetted in a loose condition, it is spun, but only to low counts and for sale in two-ply. . . . The future of waste artificial silk is by no means limited to its direct association with wool. Its advantage for general purposes over mercerized cotton is uncertain." It is still uncertain, but in England yarn made from rayon staple (not rayon waste, of course) is now said to be capable of competing with combed Egyptian.

In December formulas for sizing and bleaching rayon were asked for. In the reply it was pointed out that "the yarn, being of a wooden nature, is easily broken, and it is necessary to use some kind of a softener. The penetrating action which is one of the most striking properties of monopol oil makes that oil a valuable help in bleaching with peroxides."

End of Apprenticeship

Now that we have had a glimpse of some of the first difficulties encountered, let's skip ten years and see how mill men were getting along with rayon in 1925; but before doing this, it will be helpful to give a hasty glance over the fields which rayon had entered by that time. The beginning of 1925 marked something of a dividing line between the apprentice days of rayon and the period when the textile industry began in all seriousness to put it to work.

Rayon early entered hosiery. Records show that American hosiery mills were using the imported fiber in 1908 and that by 1912 it had carved something of a definite niche for itself in the hosiery trade. Even as late as 1920 nearly 35% of all rayon produced went to that branch of the industry, although at that time and for a few years afterward it continued to be used largely as a plating to conceal cotton or as a backing to be concealed by silk.

In 1912 and 1913 rayon was finding

Mills now have more complete testing facilities

definite uses in knitted scarfs, coat braids, dress trimmings, neckties, tapestries, gas mantles, and other articles where it was not likely to be damaged by that devastating process to which so many consumers persist in subjecting textiles—washing.

Rayon rose to a speaking acquaintance with knitted outerwear and underwear in 1916 and '17; but here, as in hosiery, it was not trusted by itself to any great extent. It usually had to be supported by cotton or wool. By 1925, however, it was going extensively into vests, bloomers, step-ins, etc., and into some all-rayon outerwear.

All this time rayon was creeping stealthily into woven goods—but mainly as decorations to spruce up shirtings, draperies, bedspreads, table covers, lamp shades, kimonos, negligees, etc.

By 1925 it had become important as filling for cotton dress goods and linings. The Botany Worsted Mills, that year, introduced a two-tone effect in rep, obtained by twisting rayon with worsted; and other woolen and worsted mills were using it in various ways. More important, however, was the fact that silk mills were producing all-rayon fabrics—mainly taffetas and satins. The yarns had not been found adaptable to creping.

Puzzles of 1925

The first technical question of 1925 —the 5,331st on any subject published —concerned the manner of distinguishing between five different brands of artificial silk. This was a decidedly new sort of inquiry, as previous to 1915 our readers seemed to recognize only one type of synthetic fiber—viscose. Our answer was—as usual, of course—detailed, illuminating, complete.

The next question concerned the possibility of splicing artificial silk in winding from skein to bobbin. We stated that, although the ends of the rayon (we had now largely abandoned the term "artificial silk") could be twisted together with starch or moisture, it was far preferable to use the weaver's knot.

How to finish a rayon-face, cotton-back lining followed soon. Our lengthy reply, as we look it over now, would be as suitable for the purpose today as it was then.

The year had started slowly, and the three preceding inquiries were all the ones on rayon that we had published during the first four months. In May, however, the flood began.

First: "Does rayon yarn make a good combination with worsted yarn?" Yes, we said, rayon affords a desirable luster, its threads will remain sharply defined after finishing, and the fabric can be cross-dyed.

Second: Hosiery consisting of rayon plated over silk was being ruined in two dyehouses. How come? The rayon was originally weak or had been weakened by rough needles, we declared, and the ordinary action of the bleaching solution was sufficient to break the thread.

Next an inquirer was told that waste silk is better than waste rayon for blending with wool.

How to get the rayon in a rayon-cotton mixture to dye darker than the cotton, came soon. We explained a trick which involved adding more glauber salt and raising the temperature after the dyeing had progressed a while.

Another reader requested, and received, a formula for peroxide bleach on rayon-wool hose.

Filling Bars in Dress Goods

Then came a problem which, fortunately, is not so serious today as it was then: "I am inclosing a piece of rayon-filled dress goods showing filling bars or recurring tight places. You will note that these are entirely different from the individual 'shiners' made by poor shuttle tensioning, long-tail knots on quill, or uneven take-up." We replied: "The samples submitted were woven on a plain loom. The majority of these cloths are now being woven on drop-box looms on account of the different degrees of luster found in rayon. It is our opinion that the imperfections are not due to the manner in which the cloth is woven, but to the poor quality of the rayon. Poor quality of this nature is quite common and is not

always confined to the gray rayon. It is common in the dyed material. Bleaching has helped to make the luster more uniform, but much bleached rayon is almost as bad as the unbleached."

The problem suggested by the following inquiry led finally, in 1936, to the devising of an important D-13 standard: "We attach a clipping of a cloth, the warp of which is rayon and the filling a 4-thread 13/15 crepe. The weave is a five-shaft satin. You will observe this cloth ravels very freely when cut warp-wise and, as such, you can at once imagine that, from a dressmaker's point of view, it would be very difficult to handle and therefore objectionable." How to prevent this raveling? "This cloth," we replied, "is a five-harness pattern, with about 150 ends per inch of warp, reeded about 50/3, of rayon, apparently about 150-denier, and with a substantial twist to it. It has been woven with about 80 picks of a 4-thread 13/15-denier crepe twist filling. Weight for weight, there is therefore about 4½ times as much warp as filling. Owing to this ill-balanced construction, coupled with the fact that the weave is a satin, it is evident that the small number of thin filling threads can have but little hold on the mass of heavy, slippery warp ends; and, very naturally, the latter ravel off with the greatest ease." We suggested a change in construction, but also pointed out that "the trouble might be materially lessened by putting a heavy dressing on the back of the cloth so as to stick the threads together, coupled with a light breaking so that the fabric would not feel too stiff or boardy."

Filling Bars Again

The filling-bar problem came up again in June, when two samples of fabric were submitted. We found that in one sample poor quality of the yarn was again responsible, but that in the case of the second sample the yarn had been strained in some way, either in the process of winding or in the weaving. We volunteered the following advice: "All knots and bunches, where possible, should be put on the shoulder of the cop or bobbin and not brought down on the taper, as all yarn that catches in running off the bobbin will make such places as are shown here."

A sample of cloth which we were asked to identify proved to be a rayon tricot suitable for scarfs and hat bands. The next request was for a formula and procedure for scouring rayon knit fabrics. Then we had to explain, as we have since had to do over and over again, why one of two submitted samples of rayon fabrics was not so good as the other.

In reply to another question on the blending of rayon waste with wool, the following information was offered: "For several years the products made from artificial-silk waste have been used in blends with wool for both woolen and worsted fabrics. In many cases, rayon straight is used in the face of pile fabrics, bolivias, and other cloths, and these are spun either on the Bradford or mule system."

In August we inspected a sample of half hose containing 150-denier rayon plated over 60/2 cotton, and we declared that it is good practice to use cotton yarn of about the same size as the rayon in order that the "fabric texture will remain uniform with no stitch adjustment."

"I am inclosing a piece of rayon-filled 2/2 twill, natural silk warp, that shows very bad cockles," wrote an inquirer in September. We blamed too much tension on the filling and added: "We have found that during the quilling process, if a pad is put on the quilling frame, this to be soaked with stainless oil, and the rayon thread run over the pad as it passes through the quill, the matter will be helped considerably."

Winding at Fault

Another case of shiners in rayon-filled cloth was blamed on the yarn rather than the weaving. In an article that month we pointed out that in such cases the defects in the yarn are often due to stretching of the rayon in winding.

Streaks in a rayon stocking brought to our attention in September were blamed on irregular tension on the rayon as it was being fed to the machine. "If the yarn is wound in too soft a package," we said, "a skein will sometimes draw hard and pull the strand into the yarn already wound, so that it pulls off hard in unwinding. Sometimes, with long-necked bottle bobbins, the yarn will drag on the neck when unwinding from the upper part of the conical surface and so be under greater tension than when ballooning away from the neck." Today we have instruments to test the density of packages.

The rayon of a rayon-cotton hose was being tendered in the bleaching. We checked over the inquirer's procedure and said: "The less time you can run rayon through the wet processes, the better and stronger it will come out in the finished product. We suggest, therefore, that you run the amount of chemicals used just as low as possible, also cut down on the boil to three-quarters of an hour instead of one hour. In dyeing, run the goods just under the boil instead of just boiling them. Check up each step carefully and make all possible speed."

Inquiries came thick and fast during October, November, and December of that year, 1925. Every day more mills seemed to be going into the making of some product wholly or partly of rayon. The great movement which was destined to place rayon in the top ranks of textile materials had begun. We haven't space to review all the inquiries of that final quarter.

Bewilderment No Longer

Perhaps it would now be logical, in the development of a well-rounded story, to skip another ten years and review the questions and answers of today; but recent problems are too fresh in our minds to require a detailed survey. It may be sufficient to say that in general they indicate the days of bewilderment are over.

The superintendents and overseers now handling the material—no longer a new material—have a background of personal experience on which to draw. They know and understand the peculiarities of the fiber. They have machinery at their disposal better adapted to handling it—as we explain elsewhere in this issue. They have chemical compounds especially developed for treating it—many of which are listed on other pages. They have more complete testing facilities of their own. Furthermore, the rayon of today is a far better material with which to deal.

Therefore, the problems which readers are now encountering and concerning which they are most likely to inquire are mainly those which are introduced by changes in style. In other words, as fashion demands a new type of fabric construction, mill men sometimes find their past experience inadequate to cope at once with the new requirements.

YARN DYERS

No story of the improvements in handling rayon in the mill would be complete without mention of the progress made by commission dyers of rayon yarn. As far back as 1898 Hellwig Silk Dyeing Co., Philadelphia, dyed commercially "artificial silk" which had been imported from Belgium. In 1912 this company installed a vat dyeing department; by 1920 it had entirely supplanted hand dyeing by machine methods. Another Philadelphia concern, Globe Dye Works, went into the dyeing of rayon in 1922 and has specialized particularly in fast-color work. Franklin Rayon Co., Providence, the largest of the rayon yarn dyers, has pioneered in package dyeing of rayon yarn. Other companies prominent in the field include Malina Co., New York; Robison Rayon Co., Pawtucket, R. I.; and Le Bon Bleach & Dye Works, also Pawtucket.

STAPLE FIBER . . . ITS RISE AND REIGN

Analysis of its history, present status, and prospects in textile manufacture

THE steadily increasing interest in staple fiber which has lifted this textile from obscurity into widespread use within a few years is one of the significant features of the present rayon picture. The story of staple fiber is international. It spans a period of some 24 years, dating from 1909 when the first patents covering manufacture of staple fiber were issued in Germany. Actual commercial production of this fiber began in Germany in 1916; it was known as Vistra and was exported subsequently to this country where it was mixed with cotton by the Fitchburg Yarn Co., to produce the well-known "Sase."

American production of staple fiber began in 1926 when it was introduced to the home market by the Du Pont Rayon Co. Among firms which have entered the staple spinning field in this country during subsequent years are: Nyanza Mills, Woonsocket, R. I.; Quissett Mill, New Bedford, Mass.; Waypoyset Mfg. Co., Pawtucket, R. I.; American Silk Spinning Co., Providence, R. I.; Cheney Bros., So. Manchester, Conn.; Textiles, Inc., Gastonia, N. C.; Nonquitt Mills, New Bedford, Mass.; Newnan (Ga.) Cotton Mills, Falls Yarn Mills, Woonsocket, R. I., etc. Meanwhile, important experimental work had gone forward in Italy, where Snia Viscosa had begun commercial manufacture of the fiber. Snia Viscosa soon achieved a significant position in the field abroad, and its product has been imported to the U. S. in increasing quantities by Meyer & Marks, under the trade name, "Sniafiocco."

Examining the history of rayon staple, we find that its progress parallels in certain respects the progress of filament rayon itself. Filament rayon had to battle both tradition and ignorance before winning wide acceptance in the yarn-consuming industries. Likewise, staple fiber's progress has been hindered by misunderstanding. Today it is suffering as much from the overclaims of its friends as from the underclaims of its foes.

The purpose of the present paper is to analyze and interpret staple fiber's present status in textiles, with some forward thoughts as to where its market expansion is tending. The picture will be considered from eight main aspects, as follows: (1) characteristics of staple; (2) types of product in which it is now used; (3) varieties of yarn mixtures; (4) competition with other fibers; (5) market resistance to staple; (6) sales promotion of staple; (7) processing aspects; and (8) possible new markets for staple.

Characteristics of Staple: Among the chief advantageous characteristics which staple fiber imparts to fabrics are softness and good draping quality, which are due to the following three fiber properties: (1) flexibility; (2) fineness; (3) smoothness. Another advantage is availability in long and uniform fiber lengths. Also, spun rayon yarn has a special type of luster which is soft and glowing. Among the chief disadvantages of spun rayon are: It is delicate and easily damaged in wet state and needs especial care in the finishing; and the yarns are deficient in strength, due to weakness in the fiber and inferior spinnability. Of course, the values of spun rayon vary greatly with the type of fabric made.

Types of Products in Which it is Now Used: Indeed, one of the most significant features of staple is its remarkable versatility. While the first staple vogue of a few years ago was limited to a single crepe construction which soon outlived its popularity, the present market for this synthetic embraces many of the chief textile usages. From point of consumption, it is estimated that staple goes 75% into weaving and 25% into knitting branches. In the woven group, women's and children's dress goods are dominant, these including both prints and plain goods. Among the popular constructions are plaids, novelty fabrics, oxfords and twills.

The silk-rayon and cotton mills led the way in applying staple to women's dress goods, but the current season has seen important gains by staple in the woolen and worsted division of the dress goods field. The progress made by staple fiber in men's summer suitings has been remarkable. In the knit goods field, approximately 80% of the spun rayon goes into outerwear, 15% into underwear and 5% into hosiery. However, with the constantly increasing use of staple in half-hose, that percentage may be too low. An interesting point is that staple is now being used to a moderate degree for five-eighths and three-quarter lengths hosiery.

Varieties of Yarn Mixtures: Our survey indicates a marked decline in the mixing of spun rayon yarns with cotton yarns, and an increased output of all-spun rayon fabrics by cotton weavers. Several important firms definitely characterize cotton-staple mixes as "out"; the chief objection made to this combination is that a yarn 75% cotton and 25% staple only adds cost to cotton fabric without compensating advantages; the sales value of such yarn, it is asserted, increases pro rata to the increased staple content.

The worsted field, however, presents a different picture. These weavers are paying constantly more attention to staple-and-wool combinations. Also silk mills this season find satisfactory outlets for fabrics which are 10 to 20% wool and the rest spun rayon. Likewise, cotton mills are combining spun rayon variously with filament rayon, mohair or wool. Manufacturers of women's worsted dress goods, in which field staple is becoming important this fall, offer fabrics of spun rayon warp and worsted filling, or vice versa; the chief aim of this development is to cut cost, though some worsted goods houses claim that it lends novel style effects to the fabrics.

Among the limited uses of staple in men's standard suitings one popular construction is 30% spun rayon and 70% worsted; this fabric is offered by several foremost worsted mills. Sometimes these mills combine 30% staple, 50% worsted and 20% cotton in men's suitings which fabrics sell in the $1.50 range. An interesting new development by weavers is a combination of acetate staple and viscose staple which fabric has a smart, speckled effect. Spun rayon is being combined with mohair on a limited scale by worsted manufacturers.

In the knit goods branches, spun rayon is rarely used alone. Much interesting experimentation has been done by hosiery and outerwear mills in combining the staple with other fibers, and some distinctive and wholly new effects have been achieved. One favored yarn, used for neckwear, hosiery and dresses comprises 15% rabbit's hair, 10% wool

and 75% staple; this sells at $1.75 in colors. Other knitters make similar merchandise out of 80% spun rayon and 20% rabbit's hair; or 80% spun rayon, 15% rabbit's hair and 5% silk nubs. A new and popular combination for novelty knitwear effects is 40% spun silk and 60% spun rayon. The use of rabbit's hair in combinations with staple seems definitely on the increase among knitters. Probably the most distinctive combination in the high style field for knitted outerwear is 50% long angora and 50% staple fiber. The price of this yarn, $4.00 per lb. white, necessarily limits its market.

Competition With Other Fibers: It is still too early to state with any degree of exactitude, the competitive effect of spun rayon's increasing popularity on other fibers. However, this aspect is rapidly gaining in importance. Cotton mills report that their women's dress goods fabrics, made of 10 to 20% wool and 80% staple are competing with all-worsted lightweights. Certain yarn firms claim that when staple is mixed with a small percentage of good quality worsted, the fabric is on a par with cheap worsted in cost, yet has the appearance of high grade worsted. Staple fiber appears to offer direct competition to cotton in the cotton goods branch; some important cotton goods mills have curtailed their fine cotton dress goods departments to permit expansion of staple lines; others have developed staple fiber fabric departments. Likewise, the same firms in some cases have discontinued low-end rayon fabrics.

It is estimated that today staple-fiber merchandise competes 70% with cotton, rayon and silk, and 30% with wool, mohair and worsted. Such estimate would tally with current market reports in the weaving field which indicate that 70% of spun rayon yarn goes into lightweight fabrics and 30% into heavyweights, these being mostly dress fabrics, in both divisions. Analysis of the competitive factor is further complicated by the fact that in the fine cotton dress prints division, the same construction of all-staple fiber goods can compete with either silk or wool, depending on fabric design.

In spring, with the required changes in construction, the all-staple fabrics imitate linen and sell substantially below that fiber. Obviously price is a vital aspect; the cost of the finish determines to a large degree whether all-spun rayon goods shall compete with cotton or with fine goods. Thus, by selection of printed design, the mill has its choice of putting the same spun rayon cloth in any of four classes—(a) wash goods; (b) rayon; (c) silk; or (d) wool.

Market Resistance to Staple: This problem is gradually solving itself in the cotton and rayon divisions, thanks to very profitable business in spun rayon fabrics during the current year. In the worsted branch, however, many manufacturers and distributors remain skeptical. The chief advantage of spun rayon in the cotton goods field is that it adds style and distinction to fabrics. The wide diversity of designs and effects possible with spun rayon has militated to reduce resistance to the higher cost, since it permits higher prices. In the worsted branch, with a few exceptions, manufacturers use it, more or less under protest; staple fiber is regarded by them as inferior and the chief purpose of mixing it with worsted yarns is to reduce the cost and permit increased volume. However, spun rayon has a definite place in the worsted field apart from price considerations; the newest mixtures are proving that it can give interesting new style effects to the heavier weight fabrics as well as to lightweights. All signs point to gradually increasing use of staple on worsted looms. However, such expansion will in turn bring new problems, as for instance, the question of labeling staple-and-worsted merchandise with respect to fiber content.

The retail aspect presents a problem. Acceptance of spun rayon merchandise by stores is still only lukewarm and much educational work remains to be done here, if the newest of synthetics is to achieve the distribution that its qualities warrant. Retailers are uncertain as to the proper placing of spun rayons in their merchandise. The question of grouping these with cottons, rayons or woolens in store departments awaits a solution and this too is impeding spun rayon's acceptance generally. Cotton goods mills report that stores refuse to display spun rayon merchandise with wool goods; the retailers argue that when the staple fiber fabrics are sold by a cotton goods house, they should be classed with cottons, which obviously means lower prices.

Promotion of Staple: Promotion of staple, so far, is limited to spinners, weavers and knitters. Little or no concentrated effort has been put forth to build consumer interest in spun rayon merchandise, by the fiber and yarn groups as a whole. However, the success which has followed individual promotive effort has influenced the fiber and yarn groups to start studying this question more minutely. With respect to brand names, staple seems to be following the lead of its elder brother, filament rayon. The rise of the new fiber has brought forth various brand names which are already widely known.

However, domestic manufacturers of staple, are not 100% agreed that brand name promotion is the best method. One foremost company continues to sell staple under the firm name. This firm is understood to be opposed to the use of the brand name, contending that "there are too many brand names already in the rayon industry" and that multiplicity tends to confuse the buyer, with respect to the various brands offered by a single company. Staple fiber distributors are following the precedent set by filament rayon, in exercising close control over the use of the yarn. Standards have been established governing construction, etc.

Processing Aspects: Weavers and knitters report that one of the major advantages of spun rayon is its good affinity for dyes, and certainly the newest spun rayon prints offer confirmation of this. Clarity and vividness of color are notable characteristics of printed staple fiber merchandise. Spun rayon takes the anti-crease process satisfactorily, and an increasing percentage of dress goods made from this yarn are being given that treatment. The need for crease-resistance, of course, depends largely on the type of fabric and garment made from it. Spinners assert that shrinkage, which originally proved a problem, now is controlled by good finish. Introduction of spun rayon has brought new problems to the finishing industry and these are gradually being mastered.

Possible New Markets for Staple: Among the important markets now being developed are women's worsted dress goods, previously discussed. Women's coatings of wool, worsted or mohair, are a prospect; some manufacturers of these fabrics are studying possible use of staple fiber from the cost angle and experimenting with it in combination with the heavier yarns. There is likelihood staple fiber may soon be used for decorative bases, chiefly in nubs or twists, to lend style novelty to these winter-weight coatings. The upholstery fabric mills also are experimenting with the yarn. In the knit goods field further expansion of staple uses seems imminent, notably in polo shirts.

WANTED: A NEW NAME

SEVERAL members of our editorial staff, studying the staple fiber development from different angles, have come to the same conclusion on one point; namely, that there is a need for a new generic name for this textile raw material. The term "staple fiber" not only is confusing to the textile man, due largely to the ambiguity of the word "staple," but, from the standpoint of consumer acceptance, is entirely lacking the esthetic appeal.

The term "artificial silk" undoubtedly retarded acceptance of rayon for several years. The same mistake should not be made again.

The new term should be simple, phonetic, and—if possible—descriptive. Even at the risk of going through agonies similar to those which preceded the birth of the term "rayon"—including the horrible "glos" incident—we throw open our mail to suggestions on the above.—***Editor.***

RAYON MERCHANDISING

—25 YEARS AFTER

THE story of rayon merchandising between 1911 and 1936 is a study in contrasts. 'Way back in the cradle days, a crude over-bright yarn, 150 denier, was being bought with much hesitancy at $1.85 per lb. by hosiery manufacturers who used it as a substitute for silk. From that stage, through swift cycles, the industry has progressed to the point where today it sells its yarn to most of the major textile divisions. There is no need to dwell here upon the multiplicity of uses for rayon, or to examine in detail the very sound and comprehensive merchandising policy which today guides the industry in distribution of its product.

Rather let us take the forward view. The merchandising policy which has been developed through rayon's first 25 years is significant mainly for what aid it may give in shaping the industry's merchandising policy during the next 25 years. When we examine the picture from that angle various vital aspects present themselves—aspects which promise to become increasingly important as the rayon markets widen. Certainly rayon's merchandising problems of tomorrow will be totally different from those of yesterday or today. Thanks to continuous and ever-expanding sales effort by the merchandiser, paralleled of course, by the accomplishments of technicians in improving the yarn, rayon today, it may safely be said, has definitely arrived. It is established and recognized as a major textile.

Looking then to the future, the question arises, what are the industry's major merchandising problems? Three chief needs come to mind: (1) a more clearly defined fiber identification policy; (2) a soundly integrated policy for the merchandising of staple fiber; and (3) continued emphasis on fashion acceptance of high quality rayons without any lessening of pressure for volume in the popular-price field.

We will consider these chronologically. With respect to fiber identification, let us acknowledge first that rayon's inferiority has become a thing of the past. Thanks to vigorous promotion of the word "rayon" by some producers, the generic term has won acceptance in most divisions. But the job is not yet completed. Rayon is not yet being given full identification. It is clear that, if the industry is to have fullest opportunity for future development, rayon henceforth must vigorously combat any misrepresentation. The merchandiser must insist that the rayon content of textiles in all stages of manufacture and sale be clearly indicated by percentages. This is essential if merchandising is to properly reflect rayon's technical advance. In filament rayon, identification is already a pressing issue; in staple fiber, it promises to become even more important.

And that brings us to the second major issue: how shall staple fiber be merchandised? At present, due to its newness, staple fiber, whether in the raw, the yarn, or the fabric state, is being sold by more or less hit-or-miss methods. In promotion of merchandise made from staple fiber, two needs are paramount: (1) a generic term, simple and understandable to all concerned (one advantage of such a term will be the elimination of the present confusion due largely to the double connotation of the word "staple"); and (2) a definite merchandising policy, properly fitted to this new textile, and broad enough to guide the sales promotion division in selling the fiber to the many markets now opening. Staple fiber has one hereditary advantage, namely, the parallel between its problems and those of filament rayon, with respect to traditional resistance. Just as operators of silk and cotton looms opposed rayon's original entry into textiles in the early days, so now the manufacturers of heavyweight fabrics are skeptical and antagonistic toward staple fiber.

The merchandiser of staple can learn much from yesterday's experience in merchandising filament rayon; for one thing, he should know the importance of avoiding over-claims and exaggeration. However, he cannot duplicate the sales methods he used in promoting filament rayon. He is selling an essentially different product to an essentially different market, and must develop his merchandising policy accordingly. As filament rayon competed first with silk and second with cotton, so now staple fiber faces competition—in a wider range—with wool, mohair, silk, cotton, even at times with filament rayon itself. A carefully planned effort to educate users on the values and characteristics of staple fiber merchandise is a major need in all branches, from the rayon producer through the spinning, weaving, and knitting finishing divisions, clear down to the store and the ultimate consumer.

Turning to our third point, the importance of continued sales pressure at the top of the fashion and quality strata, we need do little more than report satisfactory progress. Rayon merchandising has made amazing progress in that direction during the quarter century just closed. While it was true that between 1925 and 1930, the industry's technical development had gone far ahead of its merchandising effort and fashion acceptance, later activity has caught up the slack here. The present picture is impressive. Accepted alike by the fashion arbitors of Paris and New York, rayon today is strongly established as a quality textile. There remains only the essential need for constant vigilance toward further fortifying its position at the top, and for the development of wider markets in lower price ranges—all to be kept abreast of the technical advance toward constantly finer luxury fabrics.

Such then is the birthday story of rayon merchandising—25 years after. Since birthdays are usually an occasion for testimonials, it is only fair that one should close with a tribute to the far-sighted sales executives in all textile branches who made rayon's merchandising cause their own in days gone by when that cause was far from popular.

WORLD RAYON OUTPUT ESTIMATED

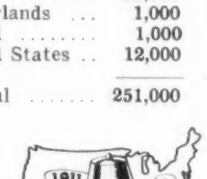
Below is our Manchester (Eng.) correspondent's estimate of this year's world rayon yarn and staple fiber production, as compared with last. Naturally, these estimates are purely preliminary and subject to revision.

Estimated World Rayon Yarn Production (1,000s of lbs.)

	1936	1935
Argentine	400	....
Austria	1,800	1,850
Belgium	14,100	13,850
Brazil	4,000	3,940
Britain	130,000	111,800
Canada	14,000	12,750
Czechoslovakia	6,500	6,150
France	50,000	52,000
Germany	112,000	103,000
Greece	200	200
Hungary	240	200
Italy	90,000	85,800
Japan	246,000	224,200
Netherlands	21,000	20,000
Poland	10,800	11,260
Russia	14 000	12.500
Spain	3,500	7,200
Sweden	3,000	1,320
Switzerland	8,000	8,100
United States	275,000	256,660
Total	1,004,540	932,780

Estimated World Rayon Staple Fibre Producton (1,000s of lbs.)

	1936	1935
Britain	30,000	7,105
France	12.000	8.000
Germany	75 000	53,000
Italy	85,000	77,000
Japan	35,000	12,000
Netherlands	1,000	500
Poland	1,000	680
United States	12,000	5,000
Total	251,000	163,285



ADVERTISING PAGES REMOVED

THE OVERSEERS' CORNER

Hiring Second Hands

By a Mill Superintendent

WHEN I came to this mill it was the custom for each overseer to pick out his own second hands. When there was a job to be filled, the overseer would select one of his men to promote, or get someone in from outside, and the superintendent wouldn't have a thing to say about it all. That isn't the way I think things should be done. I'm responsible for the organization in the mill and you can be sure that I want something to say about who fills this or that job. Too often the overseer is inclined to select a close friend or relative, and that isn't the way to get an efficient staff.

Quite a howl went up, figuratively, when I announced that the old plan was out and I know the overseers went around muttering to themselves about my taking away their "rights" and all that sort of thing. One or two came to me and stated that they honestly believed that letting the overseer have the complete say was the better method because he was in the best position to know the capabilities of the men and the one who had to work with them day after day. I told them that I intended, of course, to ask the opinion of the overseer before any move was made, and that in most cases the overseer's advice would be followed, but I wanted it understood that I was going to take an active part in handling second hands. After all, second hands are ambitious to get ahead and how would I know whether one of them was capable of being moved up to an overseers' job if I didn't keep in touch?

Some overseers seem to think that they run a little kingdom all their own. That's old stuff and not in keeping with modern times. Pride is a funny thing, though. A couple of the overseers were sure they weren't going to like the new system worth a darn until I told them that, while I would be active in making decisions about second hands, I would be in the background and the overseer himself could have the pleasure of telling a man he was promoted, or whatever it happened to be.

Reports Must Be Fair

Editor, Overseers' Corner:

A record-card system of the nature described can be valuable if and when it is manifestly fair and impartial. In order to be impartial actually, extreme care is necessary that no hidden factors operate unfairly to the discomfiture of any worker. Since there always are hidden factors of greater or lesser magnitude, it is extremely important not to make comparisons as between different workers unless and until the facts are so positively established that there can be no possibility of mistake.

Jones, on one piece of equipment, will produce so much work per day on the average, as revealed by his report card running over a space of three months. Wilson, on a very similar and perhaps seemingly identical equipment layout, has made a somewhat better showing. On the face of it, Wilson is the better man. But in actuality, there may be any one of fifty other reasons for the difference. Wilson may have an advantage relative to lighting, to heat, to machine drive or to some other factor that has gone unnoticed through the years.

One of the worst things that could be done under certain circumstances would be to bluntly call the attention of Jones to the better showing of Wilson. A point in strategy would be to suggest that the two change equipment, trading, as it were, for a time, with the idea that each might find possibilities for improvement in the mechanical layout. Very often such a change will bring hidden factors to light. If Wilson finds himself facing a disadvantage he did not face before, he will, under such an invitation, bring it to light and the same will be true of Jones. Further, the opportunity will be afforded management of quietly checking the showing of the two men over the next period of time in their reversed positions. If Wilson again shows in the lead, without any mechanical changes having been made, the proof is pretty good that he is the better man of the two.

J. H. Y.

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Favors Report Cards

Editor, Overseers' Corner:

The so-called report card on workers or departments is merely getting accounts into understandable figures so everybody can read the facts. For example after determining the maximum percentage of waste, spoiled work, etc., allowable (and this should be a practical limit not some theoretical figure) any operative or department appearing to be running near the maximum should be labeled for analysis.

We found that a simple card record of the waste or spoiled work of each operative required only a few minutes of the timekeeper's or cost-clerk's time and gave valuable data on the costly help who were candidates for lay-off when the force required reducing. A summary of the workers in a department was one of the factors determining the effectiveness of the overseer or foreman. There never were any arguments except, "the machines are not in good running condition." The answer to that was short and sweet: "You are responsible for the condition of the machines in your department. Have I ever denied you help on reconditioning them?"

We have applied the same plan to machine plants to show the relative effectiveness of operatives and departmental foremen. The results invariably cause one or other of two things to take effect: First, the delinquent operative or foreman hops to it and gets his rating up to snuff, or, second, the accumulative evidence burns the super so much that he tells the overseer to let So and So go because he is too expensive a luxury, or the foreman or overseer is out.

G. E. E.

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More on Night-Day

Editor, Overseers' Corner:

I quite agree with C. J. in the July issue on how much authority a day overseer should have over the night overseer. In my experience, I have seen quite a number of night overseers ruined, due to the "bossy" attitude of the day overseer. Of course, it seems to be a general understanding among overseers and superintendents that the day overseer should have oversight of the night overseer, but I say that if the night overseer is not capable of running his job without continual advice from the day overseer, then why have a night overseer? Just get a second-hand and tell him in the beginning that he will look to the day overseer for instructions. I can well remember, when I was night overseer of carding and spinning, how resentful I was of taking orders from the day man. Of course, I was instructed by the superintendent that I was responsible to the day over-

CONTRIBUTIONS

Contributions to "The Overseers' Corner" will be paid for without regard to length. We will be glad to use letters discussing the narrative on this page or any other pertinent matter whether of mechanical, managerial or just plain human interest. Those who contribute kinks or practical helps will be paid additional for an appropriate sketch to illustrate their device. It is not necessary to submit finished drawings. If these pages interest you—contribute something to them to interest others. Address Editor, Overseers' Corner, Textile World, 330 West 42d St., New York, N. Y.

seer, but how much better things would have been if this day overseer had reckoned on my ability and waited for me to ask his advice? No, instead of this, I was continually being advised by him as to how I should run my job. Such things as this are sure to be found out by the employees; then they will get the attitude toward you that if you didn't have the overseer to give you advice, that you wouldn't stay on the job.

I say it is all right for the day overseer to give advice to the night man, but he should at first let the man know that he has the interest of the job at heart and is not trying to advise him because he happens to be the day overseer. There are plenty of night overseers who are just as capable as the day overseers, and I think it is a sad mistake on the superintendent's part when he allows his day overseers to instruct the night overseers how they must do. All overseers, for the best of all concerned, should not be responsible to anyone except the superintendent. If any superintendent expects to run his mill at a profit, in my opinion the best thing he can do is to put all overseers on an equal basis and all responsible to him, then you will see less tension between day overseers and night overseers, with a sure increase in production, because any job run in true harmony is bound to prosper.

N. J. B.

Practical Helps for Overseers

Eliminating Waviness in Rayon

Waviness or barré is very noticeable during the dark-shade season, not only in plain goods but in some of the more complicated weaves such as a fancy, high-harness, two-beam, satin-back Romaine. The mills experiencing most of this trouble are those which use rope let-offs instead of the mechanical or automatic let-off. Where rope let-offs are used and trouble is had with waviness, the following points should help eliminate the condition:

1. Use only Italian hemp rope.
2. Do not use graphite or stove polish on the beam heads as this will cake on the ropes and cause an uneven let-off; instead, the heads should be kept as even and free from grit as possible.
3. Wash the ropes thoroughly in gasoline when a warp is out and discard uneven or worn ropes.
4. See that the ropes are not crossed at any place and watch the weights carefully.
5. Dress ropes at each cut mark with a powder, the formula of which consists of crushed teatite or soapstone and a waterproof material or repellent; the soapstone does not cake when used with a repellent, will not absorb moisture, and gives a smooth even let-off.

When two-beam styles are being run, the beam-stand supports should be fastened firmly to the floor to hold the top beam steady and care should be taken to see that the friction on the top beam is even. When running any style, if the sandroll bearings are worn, this will cause the press roll to bind and give a jerky, uneven let-off and causes waviness. This point is often overlooked.

J. W. B.

Reducing Seconds

A good many times when a first cut is taken off the loom and sent to the cloth room, the girl inspector finds that the weave doesn't look correct and calls the cloth room overseer. He in turn calls the weaving overseer and together they decide that a peg was left out or placed in the wrong place in the chain. By the time the

weaving overseer or second gets to the loom, a second cut is ready to be taken off and 100 yd. or more have been woven with the wrong weave. Of course the weaver and the inspector in the weave room should have seen this error, but not being familiar with this particular weave thought that it was correct.

To my mind the best method to eliminate such costly errors and to eliminate seconds almost entirely is to hold one man responsible for every new warp started up. This man should understand weaves and designing, together with drawing-in and chain drafts. If possible a textile school graduate should be obtained for this position. This man should keep in close touch with the designing department and work together with the designer.

When a new warp is started up, the first ¼ yd. woven should be taken off, warp ticket with loom number on it attached, and left with this head inspector. He should inspect this quarter yard for correct weave, proper filling, picks, width, reed marks, kinks, etc., and then he should go to the loom and inspect the harness settings, see that the reed is tight and set properly, inspect the shuttles, check the warp tension, see that the temples are not cutting the cloth, and take the loom speed. If any of these are not just right, he should call the fixer and see that they are taken care of. This head inspector should fill out an inspection ticket for each warp started up and deliver them to the weaving overseer at the end of each day. The overseer will study these inspection tickets and know exactly how many warps were started up and the faults found with each.

R. S. J.

Calculating Shrinkage

When shrinking wool goods in length to secure a desired finished weight, it is necessary to know the "clean weight" of the fabric to figure the percentage of dead loss. One piece should be washed and dried to determine the clean weight. A short rule for calculating the length shrinkage is as follows:

Multiply the difference between the clean weight of the piece and the desired finished weight by 36, and divide by the weight wanted.

For example, suppose the cloth weighs 20 oz. from the loom, and it is desired to have it weigh 18 oz. when finished. By scouring one piece the clean weight is found to be 16 oz. This shows a loss in weight of 20%, or a clean weight of 80% of the loom weight. Calculate as follows:

$18 - 16 = 2$

$2 \times 36 = 72$

$72 \div 18 = 4$. The number of inches of shrinkage required per yard.

JAMES S. SARGENT.

Questions and Answers

Weaving Plaid Backs

Technical Editor:

Can you give me any information as to how a plaid-back fabric can be woven from face up to back up by changing the chain? (8350)

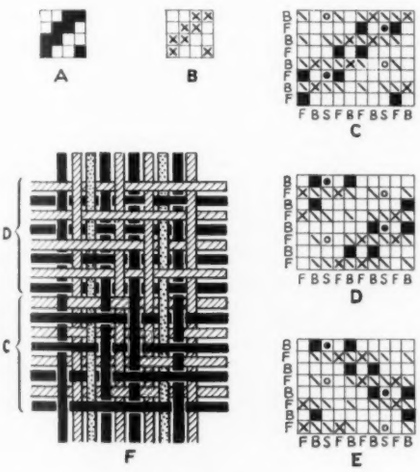
Where direction of twill—if twill weaves are employed—is of secondary consideration, it is necessary only to peg blanks. If, however, the nature of the construction demands weaving back up without altering the direction of the face and back twills, it will be necessary to reverse the picking order in addition to pegging blanks. This will be best explained by a brief reference to the following weave examples: Let *A* represent the face weave; *B* the back weave; *C*, the combination of these two weaves constructed to weave face up; and *D*, the same combination but constructed to weave back up. In each case the solid squares indicate face weave; crosses, back weave; diagonal marks, lifters; dots, face stitching points; and circles, back-stitching points.

It will be noticed that *D* is the reverse of *C* and that both show the twill going to the right on back and face when looking down on the cloth. If the back of *C* is turned over after weaving, it will be found that the twill will run to the left, whereas in *D* the same condition applies, but the underside of the latter would be the face. Therefore, *C* gives us a right-twill face and a left-twill back after weav-

ing; and D a left-twill face and right-twill back.

In order to correct this difference in twill direction, reverse the picking order, making your first pick No. 7; the second, No. 6; and so on. The reason for commencing with No. 7 instead of No. 8 is simply to preserve the filling arrangement of one face, one back. This is demonstrated at plan *E*, which in effect shows both twills running in the left direction on design paper; but, when turned over after weaving, the face twill will be right and the back left, giving the same woven results as at *C*.

Changing from face-up to back-up is quite a common practice in overcoming weaving difficulties, but is not recommended as a satisfactory solution and should be adopted only as a last resort. The reason for this must be obvious, inasmuch as the face of any cloth represents the outside of a garment and consequently calls for a better and more perfect appearance than the back, which is difficult, or at the most, doubtful of accomplishment, when woven face down.



The principle of constructing double weaves to interchange when and where desired is based on the combination of weaves *C* and *D* and is amply illustrated at the flat view given at *F*. By following the face threads shown solid black and the back threads shown cross-section, it will be seen that in section *C* the face threads are on the face, while at section *D* they pass to the back. In like manner, the back threads in *C* are on the underside and on the face in section *D*.

A brief study of the diagram shown at *F* cannot fail to facilitate a better understanding of the proper construction and the various uses to which the interchanging of face and back weaves may be applied.

Barry Effect in Knit Goods

Technical Editor:

Inclosed are two swatches of cloth, one marked "center" and one marked "selvage." These are sent to you for the purpose of ascertaining, if possible, the cause of the barry effect, which is more apparent in the swatch marked "selvage." The cloth is knit in tubular form and split. It is asserted by some that this barry effect is due to uneven yarn; by others, that it is due to faulty knitting; and by still others, that it is attributable to faulty finishing. Any information you may be able to furnish will be appreciated. (8319)

It is practically impossible to avoid a barry or pitted condition on cloth of this type and weight. The condition is due to light and heavy places in the yarn—the open, thin portions of the fabric coinciding with the light portions of the yarn. However, we doubt if the yarn could be spun any better, and the finisher has done a very good job. When this barry effect occurs on heavy fabrics, there is a chance of overcomining it by re-napping.. On light fabrics, such as you are running, there is a limit as to how far one can go in napping. We cannot make any real suggestion which will enable you to overcome this trouble. There is a bare possibility that the yarn manufacturer could produce a somewhat more uniform yarn which would help, and you might take up the matter with him. Other finishers are having the same trouble, and, whatever is done, find it very difficult to keep these particular fabrics from the barry condition.

Fast Dyes

Technical Editor:

We are forwarding a piece of dyed top and a sweater. What we should like to know is this: Is the dye used in the top suitable for bathing-suit purposes? In your estimation, does the color bleed or crock under normal treatment? Should colors like this, when used for bathing suits, be expected to stand up when submitted to fluids such as carbon tetrachloride, etc.? Can you explain the staining on the sweater? From its appearance, we have come to the conclusion that it is reasonable to suppose that this piece of merchandise was spotted in some way, probably an oil spot, and that a strong fluid of some kind used to remove the spot, thereby causing the stain. (8335)

The color in the dyed top is quite fast under normal conditions, as are the colors in the sweater. It is quite unfair to the dyer or manufacturer for anyone to make a claim against either of them on account of a discoloration made by a chemical solution. At the present time cleaning and spotting solutions have been found to contain, among other things, pyridine, Carbitol, Cellosolve, and a variety of alcohols. Many of these have a solvent action on the fastest known dyes; namely, vat dyes, and will cause some color to be dissolved from the fastest dyeings it is possible to produce. There used to be a word "indelible" applied to inks, etc.; but since an "indelible ink remover" appeared on the market, the word has lost cast. No dye known at present is indestructible or absolutely insoluble, all we have to do is search and find a solvent for it. We believe that you are correct in your assumption that the sweater was spotted with some unsuitable compound and we feel that there is no basis for a claim.

Stockings Are Yellow

Technical Editor:

We are having trouble in getting too many yellow stockings, as you will see by inclosed samples. This cannot be taken out by bleaching or degumming, and we should like to have your opinion as to the cause of this condition. (8330)

The samples submitted have the appearance of having been knit from pieces of silk taken off the machine and set back and allowed to accumulate. Silk in its natural state yellows with age. This tendency is augmented by throwing oils, lubricating oils, moisture, and heat. All knitters are familiar with the oxidation of silk when it is allowed to age after conditioning for knitting, either by back-winding or in a conditioning vault. Stockings knit from fresh stock will yellow if stored and aged too long.

If wet stockings are dried in a dryer where the temperature is too high, this will yellow them. Some throwing oils and back-winding oils are more susceptible to oxidation than others. The same is true of lubricating oils, and where yellow stock is developing, these materials should be investigated. We note that in one of the samples there is an excessive amount of oil in the cotton welt coming from the needles and sinkers. This mineral oil could be causing the silk to yellow. We note also that the stockings have a rancid odor, indicating that the silk or the stocking had been aged too long in a wet state.

We believe that fresh raw stock properly conditioned and processed systematically will not give this trouble.

OUTINGS

***IT IS A SIGN** of better times when mills revive the custom of having an annual outing. There have been so many the last few months that we have had a hard time trying to keep track of them, but here is a partial list anyway:*

Overseers, superintendents, and department heads of Ayer Mill of American Woolen Co., Lawrence, at Atkinson, N. H.; section hands of Arlington Mills, Lawrence, at Salisbury Beach, Me.; 1,500 employees of Chicopee Mfg. Co., Gainsville, Ga., attended barbecue; employees and officials of Booth Mfg. Co., New Bedford, 400 strong, at Sconticut Neck, Mass.; employees and officials of Clinton Dye Works and L. L. Briden Co., Clinton, Mass., at Twin Oaks; 500 employees of Belding-Hemingway-Corticelli, Putnam, Conn., at Crescent Park, R. I.; overseers and officials of Broad Brook (Conn.) Co. at Crescent Park, R. I.; United Rayon Mills, Fall River, at Crescent Park, R. I.; 1,500 employees of Sanford (Me.) Mills at Wells Beach, Me.

"Cotton Carded Cloth"

Technical Editor:

We shall appreciate any information which you can give us as regards the definition of "Cotton Carded Cloth."

One of our acquaintances emphatically states that any wool fabric that contains any cotton content is generally known by the suiting and pants cutters as a cotton carded fabric. We, for example, manufacture manipulated cloths, wool-spun both warp and filling. Both warp and filling do have a cotton content, but we have never referred to our fabrics as cotton carded cloths. (8353)

The term "cotton carded cloth," as used in the woolen trade, has a rather doubtful origin and more than likely was coined by someone possessing a more or less superficial knowledge of woolen and cotton manufacture. To the cotton man it implies a fabric composed of all-cotton yarns spun without combing on the cotton system; while the literal meaning to a wool man would be a cloth made with cotton yarns carded and spun on the woolen sys-

THE OVERSEERS' CORNER

S. T. A. Meetings

Tentative dates for technical meetings of the Southern Textile Association have been selected as follows: Weavers Division, Sept. 19, Spartanburg, S. C.; Northern and North Carolina Division, Oct. 3, probably Greensboro, N. C.; Carders and Spinners Division, late November, location undecided; Master Mechanics Division, Oct. 23, Spartanburg, S. C.; Eastern Carolina Division, Oct. 10, Spartanburg, S. C.; Gaston County Division, December, before the 15th, probably Gastonia, N. C.; Tennessee Division not arranged. The Weavers Division date is definite but the others are expected to be confirmed shortly, according to D. H. Hill, secretary.

tem, as opposed to the worsted combing system. Actually the term is intended to designate cloths made of yarns blended of woolen and cotton, as contrasted with, for example, cotton-warp cloths.

When the price of cotton yarns advanced so high on account of the processing tax, plus the increased cost of labor under the N.R.A., the market for cotton-warp fabrics was practically wiped out. Fabrics made with reworked wools and shoddy, which incidentally were placed on the market as 100% woolen goods, soon captured the cotton-warp cloth business. During this period, however, some manufacturers developed a well-constructed and attractive-looking flannel for women's bathrobes, etc., composed of cotton-wool blend yarns and piece-dyed in bright shades, which was designated as "cotton carded flannel." This was priced slightly lower than the 100% reworked-woolen types of fabric. Due to the finer textural appearance of the former, coupled with better and more attractive shades, the garment manufacturers adopted this cloth for various purposes with very successful results.

The term "cotton carded cloth" is too ambiguous, and we do not recommend its use.

Weaving Push Cord

Technical Editor:
Please explain how the inclosed fabric is made. (8333)

The sample submitted is what weavers term a push cord. The weave of cord and ground is plain throughout. The cord is pushed in on every sixth pick.

There are two methods by which this cloth can be woven. The simpler method is to use two slackeners, operated from either a dobby or cam arrangement. As little tension as possible is used, so that when the slackener is moving backward the excess of cord will not be drawn tight This method is not so accurate as the one whereby the harnesses carrying the cord are given an extra lift of about ¼ to ½ in. when the loop has to be formed. The exact amount of lift depends on the size of loop wanted. This extra movement of the harness is provided by an extension placed on the dobby lever, making the top of the harness lever much higher and thus giving the harness a greater lift on every sixth pick. This would mean two dobby harness levers for each cord harness. One harness lever will raise and lower the cord yarn about the same distance as the ground warp for every five picks. The extension harness lever will lift the cord ends the required extra distance for one pick; but when returning to bottom shed, the cord harness will not go any lower than the ground yarn because it is fastened to the regular harness strap.

When the extension lever raises the harness the required distance on the return to bottom shed, the excess cord yarn will curl on top of ground cloth, provided the proper twist is given the cord yarn. A minimum of tension should be placed on the cord warp.

Luster Wool

Technical Editor:
To what extent is the term "luster wool" used in this country and how closely does its meaning resemble that in England? In other words, it is my understanding that the term generally implies a long and coarse English wool rarely imported to this country. Therefore I should like to know what is meant by the term when it is used here and also what term or what wool used here corresponds to the English luster wool. (8349)

When a wool is termed a luster wool in this country, it means that the wool is of braid quality and possesses the necessary characteristics of a luster wool. W. T. Rich, Australian wool expert, states that braid is the Boston term for Lincoln wool. The National Lincoln Sheep Breeders Association of Marlette, Michigan, states, "There are only two important breeds of sheep that produce true luster wool, the Leicester and the Lincoln. In our own country the Lincoln thrives in the lowlands of western Oregon, and in the high dry range country of Idaho, Wyoming, and other inter-mountain states."

Alfred Hawkesworth, lecturer on sheep and wool at the Sydney Technical College, Australia, gives the following definition of the term "luster": "'Luster' implies brilliant, silvery, metallic, glossy appearance, and is found in the strongest breeds of sheep, such as the Lincoln and the Leicester only. The reflective power of the growth or covering of these breeds exceeds that of any other wool producers. This is caused by the formation of the scales or serrations on the wool, which are thick and overlap slightly and, when dyed, will take the most delicate shades, giving a more brilliant or silvery appearance than any other wool."

According to L. G. Connor, the domestic clip grades chiefly from low quarter-blood to fine—about 46s to 70s. Probably 5% would cover the extremes—braid and superfine—36s and 80s. Fine and superfine comprise about 35%; half-blood, approximately 20%; three-eighths-blood, about 25 to 30%; quarter-blood and low-quarter-blood, 15% to 20; and coarse, around 30%.

When used in the United States, the term luster wool means exactly the same type of wool to which the term applies in England, but the top would be graded as of braid quality. When processed in the mill, it is possible that from sorting room to spinning room the quality would be designated luster if it were a true luster wool.

Personal News

James C. Meade, who has served as assistant superintendent at the Mohegan, R. I., plant of Wanskuck Co., has taken a similar position with Wuskanut Mills, Inc., Farnumsville, Mass.

Henry D. Grimes has been appointed assistant head chemist of American Woolen Co. and will make his headquarters at Shawsheen Village, Mass. His former position as head chemist at Wood Worsted Mills of the company has been filled by the appointment of **Clifford Emmons.**

Henry Bassett has taken the position of overseer of weaving at Geo. E. Duffy Mfg. Co., Worcester, Mass.

George D. Simpkins, Jr., who recently resigned as overseer of spinning at Cherokee Spinning Mills, is now in charge of the rayon, wool and silk carding and spinning departments at Eton Mills, Shelby, N. C.

George Bradbury, formerly with Lawton Mills Corp., Plainfield, Conn., is now overseer of carding at Edwards Mfg. Co., Augusta, Me.

William Cudenrath, formerly with Pepperell Mfg. Co., has joined W. R. Grace & Co., New York, and has sailed for Chile, where he expects to remain for five years as a representative of the company.

James B. Neel, formerly with Paragon Worsted Mills, Providence, R. I., has gone to Cleveland (Ohio) Worsted Mills Co. as boss dyer.

Curtis S. Brotherson, of New Bedford, Mass., has been appointed junior technician at Better Fabrics Testing Bureau, Inc., New York. He is a graduate of the New Bedford Textile School, class of 1928.

Charles Wade has accepted the position of head of the boiler room of Decatur (Tenn.) Hosiery Mills.

E. B. Powell, formerly of Westminster, S. C., is now overseer of the cloth room of Gossett Mills, Anderson, S. C.

R. J. DelaMater is now safety supervisor at Bigelow-Sanford Carpet Co., Amsterdam, N. Y.

Robert F. Price has resigned as chief engineer of No. 1 Kilburn Mills, New Bedford, Mass., after 18 years of service, being succeeded by **Ashley Dobson,** former chief engineer of No. 2 Mill.

John M. Geer, assistant purchasing agent of Kendall Co., Paw Creek, N. C., has become assistant purchasing agent of Carolina Cotton & Woolen Mills Co., Spray, N. C. He will work under **W. G. McCollum,** director of purchasing.

Clifford Mongeon is now in charge of twisting, winding, and warping at Ames Worsted Co., Southbridge, Mass. He was with Lorraine Mfg. Co., Pawtucket, R. I.

THE OVERSEERS' CORNER

Arthur **Hubbard** is now day overseer of carding at Hillcroft Woolen Co., Wales, Mass.

Reginald **Fant,** former carding overseer at Wyandotte Worsted Co., Pittsfield, Mass., has accepted a similar position with Standard Yarn Co., Worcester, Mass.

J. **W. Skipper** has assumed his new duties as overseer of carding and spinning (second shift) at Jennings Cotton Mills, Lumberton, N. C.

James **Little,** formerly with Elm Mills Corp., Tilton, N. H., is now designer with Coe Woolen Co., Worcester, Mass.

J. **F. Plexico** has been appointed overseer of carding and spinning at Porterdale, Ga., plant of Bibb Mfg. Co. He formerly held a similar position with Granite Falls (N. C.) Mfg. Co.

O. **E. Bishop,** overseer of weaving at the Springstein unit of Springs Cotton Mills, Chester, S. C., has been transferred to the firm's Gayle unit in the same capacity. **E. L. McCormick,** formerly superintendent of designing at the Oconee Mills at Westminister, has been named designer at Gayle.

James **Campbell** is now overseer of the maintenance department at Paul Whitin Mfg. Co., Northbridge, Mass.

M. B. **Mahaffee, Jr.,** has been promoted to head the dyeing department at Louisville (Ky.) Textiles.

David **M. Aulissio,** of New Bedford, Mass., has been appointed technician in the spinning department of the cotton manufacturing plant of S. Slater & Sons, Webster, Mass. He is a graduate of the New Bedford Textile School, class of 1936.

Harold **Richardson** has been made designer at Mascoma Mills, Lebanon, N. H., and **George Deurell, Jr.,** will serve as his assistant. **Clovis Cignac** has been promoted from assistant superintendent to superintendent.

Matt **Thompson,** formerly of Chapel Hill, N. C., has resigned as auditor for the University of North Carolina, a position he held for two years, to become auditor for Golden Belt Mfg. Co., Durham, N. C.

James **McKeon,** former night carding overseer at Ohio Carpet Co., West Warren, Mass., is now day carder at River Woolens, Inc., Leicester, Mass.

P. **F. Hanlin** has taken the position of overseer of finishing at Elm Mills Corp., Tilton, N. H., and **Thomas Costello** has been made overseer of dyeing.

John **Winn** has been named overseer of carding at E. G. Carlton & Sons, Rochdale, Mass. **Albert Remi** will be his second hand.

Walter **Ottel** has taken a loomfixer's position at M. T. Stevens & Sons, No. Andover, Mass.

Ralph **Davis,** formerly second hand of weaving at Dunean Mills, Greenville, S. C., has accepted position as overseer of night weaving with Opelika (Ala.) division of Pepperell Mfg. Co.

J. **O. King,** formerly overseer weaving at Werthan Bag Co., Nashville, Tenn., now holds a similar position with John P. King Mfg. Co., Augusta, Ga.

J. H. Jolly has been promoted to overseer of spinning, spooling and finishing at Bibb Mfg. Co., Macon, Ga. **Joe Pittman** has been made overseer of knitting at No. 2 mill. **William C. Calhoun** is shift foreman at the same plant.

S. A. McCash has been made overseer of carding at Eagle & Phenix Mills, Columbus, Ga., succeeding **Virgil E. McDowell,** resigned.

W. H. Spencer, Jr., formerly connected with Springs Cotton Mills, Lancaster, S. C., has been made second hand of weaving at Watts Mills, Laurens, S. C. He graduated from Clemson College textile school in 1933.

Sydney D. Wilson has been named superintendent of the Cocheco woolen mills in East Rochester, N. H., to succeed P. Rosch. He was formerly with the Hayward Woolen Co., East Doulas, Mass.

J. R. Milliken has been promoted from cloth room overseer to assistant superintendent at the Nashua Mfg. Co., in Nashua, N. H. **Daniel Leighten** has assumed charge of the cloth room.

Ralph H. Harrington has succeeded **Chester H. Alley,** who resigned as master mechanic at the Cocheco Woolen Co., in East Rochester, N. H. Mr. Harrison was formerly with the Narragansett Mills in Wakefield, R. I.

Joe Pittman has been promoted to overseer of knitting at Bibb Mfg. Co., Macon, Ga.

B. F. Underwood has been advanced from overseer of carding to superintendent of Piedmont (S. C.) Mfg. Co., succeeding **C. M. Moore.**

C. J. Waldrop of Rockingham, has become overseer of weaving at the Mansfield Cotton Mills, Lumberton, N. C., succeeding **C. E. Faulk,** who resigned.

N. C. Dawkins of Anderson, S. C., has assumed his new duties as overseer of winding at Chadwick-Hoskins Mill No. 2, Charlotte, N. C.

A. E. Bristow is now overseer of carding and spinning at Ida Mills, Laurel Hill, N. C.

F. M. Fowler, formerly overseer of weaving, night shift, Chadwick-Hoskins Mill No. 4, Charlotte, N. C., has been promoted to overseer of weaving, day shift, at the No. 1 plant of the same mill.

John Peacock, formerly of the Macon, Ga., unit of the Bibb Mfg. Co., is now overseer of carding at the Atlantic Cotton Mills, Macon.

B. S. Pearson is now overseer of carding and spinning at the No. 2 unit of the Chadwick-Hoskins Co., Charlotte, N. C.

E. L. Holt has resigned as overseer of carding at the Atlantic Cotton Mills, Macon, Ga., and has accepted the position of overseer of carding and spinning at the Jennings Cotton Mills, Lumberton, N. C.

J. L. Rhinehardt, formerly of the Appleton Co., Anderson, S. C., is now overseer of carding and spinning at the Dresden unit of the Mansfield Mills, Inc., Lumberton, N. C.

W. I. Gibbs has been appointed night overseer of carding and spinning at the Waverly Mills, Laurinburg, N. C.

J. L. Miller has resigned as overseer at Mansfield Mills, Lumberton, N. C.

W. F. Crowder, formerly with Glenn Mfg. Co., Lincolnton, N. C., is now second hand of spinning at Chadwick-Hoskins Co., Mill No. 1, Charlotte, N. C.

G. J. Adams, of the Riverside plant of Gossett Mills, Anderson, S. C., has been transferred as overseer spinning and finishing to the Pendleton, S. C., plant.

G. W. Holt has been promoted to overseer carding, John P. King Mfg. Co., Augusta, Ga.

M. M. Tuttle, a graduate of the North Carolina State College Textile School, class of 1935, has been promoted to overseer of weaving at Mooresville (N. C.) Cotton Mills.

C. F. McDade has resigned as overseer of weaving at Lone Star Cotton Mills, El Paso, Texas, to become superintendent of J. W. Sanders Cotton Mills, Magnolia, Miss.

L. C. Inglett has resigned as second hand in carding at Stonewall (Miss.) Cotton Mills, to accept a similar position with Chadwick-Hoskins Co., Pineville, N. C.

W. G. Lockey has been promoted from second hand to overseer of spinning at the No. 1 plant of Chadwick-Hoskins Mills, Charlotte, N. C.

Textile Analysts, Designers and Technicians

The Textile Analysts, Designers and Technicians Association was recently organized for the collection of technical data for the mutual benefit of all members and the development of new ideas keeping abreast of new developments in the textile industry. The membership consists of men in executive positions in all branches of fabric manufacture.

The president of the organization is Henry Fallows, Jr., of the Berkshire Fine Spinning Associates; vice-president, Edmund B. Gifford, Luther Manufacturing Co.; secretary, Thomas E. Mason, Jr., of the Pilgrim Mills. The technical advisor of the association is Alfred Higgins, head of the Design and Cloth Analysis Departments of the Bradford Durfee Textile School, all of Fall River, Mass.

Two organization meetings have already been held, one of them last month. A tentative constitution has been adopted with plans for meetings to be held quarterly, in September, December, March and June. The next meeting will be held Monday evening, Sept. 28, 1936, at 7:30 p. m., at the Bradford Durfee Textile School in Fall River, Mass.

Slashing Hints

based on twelve years' experience in southern mills

By J. Manning Bolt,
General overseer weaving,
Brandon Corp., Greenville, S. C.

THE following remarks on slashing are based on twelve years' experience in southern slasher rooms and are for the benefit of the average slasher man who has a practical working knowledge of the operation. Only cotton yarn problems are discussed. Before going into details, it might be well to point out that good slashing will make bad yarn run better, but will not make it run perfectly. In other words, good yarn is essential to good slashing.

Mechanical Condition of Slasher

The mechanical condition of the slasher itself is important. All bearings should be in good shape and not too badly worn. Truck bearings, roller bearings, or ball bearings on the cylinders should be kept well greased with a heat-resisting lubricant which will not melt and run. All shafting should be in good shape and properly aligned in the boxes. The entire machine should be level at all points so as to prevent excessive wear. The copper roller in the size box and the box itself must be kept perfectly level or the yarn will tend to pull to the high side.

Uneven Rolls Cause Trouble

It is important that copper rollers receive special attention. The writer emphasizes this because of an experience he once had with copper rollers which taught him a lot about slashing. Anxious to make good on a new job, he was looking for trouble—and found plenty of it! One thing that worried him particularly was the fact that cloth made from warp off his slashers had a rough, harsh feel toward the center while those areas nearer the selvage appeared to be perfectly normal. Looms and harness settings were checked, and still the rough sandpaper-feel persisted. Other processes were likewise checked with no visible results. This condition had existed so long that the mill was accustomed to it.

About ready to give up in disgust, he noticed the slasher tender putting on a new blanket. The old blanket showed much greater wear on the sides than in the center. The slasher foreman, questioned, said that this condition had been common for several years and he assumed it to be all right. Placing a 6-ft. straight edge along the copper roll, as illustrated in Fig. 1, the trouble was obvious. The roll was about $\frac{1}{4}$ in. larger at the ends than in the center. This condition was caused by pressing new heads too tightly into the ends of the roll. These heads extended 5 or 6 in. into the roll, which was too far, and had been driven in cold. The hot size had expanded them until the roll had been stretched at each end. The rolls were turned down and made even all the way across. This put a permanent stop to the rough feel of the cloth, as well as to slasher blankets wearing excessively at the sides.

In order to prevent the condition just described, it is well to caliper all copper rolls and correct them if necessary. Furthermore, both rolls in the size box should be the same size. If the first roll is larger, and a heavy squeeze roll is used, it may cause the yarn to run slack between the two. If the small roll is first, the reverse is true; that is, the yarn is stretched between the two. This condition is especially prevalent in mills running old slashers.

Split Rod For Heavy Sley

When heavy sley goods are being made, it is advisable to use a split rod made of brass tubing to separate the yarn while wet and before it reaches the large cylinder. Brass should be used because size will not stick to it as it does to certain other metals. The rod or bar should be placed about 24 in. from the squeeze roll with a small V-pulley on one end connected by means of a small round belt to a similar pulley on the squeeze roll. This split rod makes the yarn separate easier and with less strain at the first lease rod. The complete arrangement costs very little and is a big help with sleys from 68s up.

Proper Tension Improves Yarn

It is advisable to leave all of the stretch possible in the yarn by keeping it as slack as possible. A good place to feel the yarn and test its tension is between the measuring roll and the first lease rod. Another point is between the squeeze roll and the big cylinder. If the yarn does not feel too tight at these points, but is tight enough to stay on the cylinders, the tension is probably satisfactory for good running. Often, yarn is ruined by packing too much on the delivery roll at the front of the slasher. This causes the tension to become too great. Also, many slasher tenders think that yarn has to be run tight to stay in lease, which is incorrect. Taking everything into consideration, the proper method of running yarn is to have the tension tight enough to keep it on the cylinder but not tight enough to unduly stretch it. Over 1% stretch is too much.

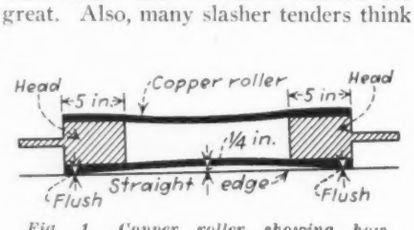


Fig. 1. Copper roller showing how heads driven in too tightly enlarged ends and caused blankets to wear.

Washer for Beam-Creel Bearings

The adjustable bearing in the beam creel should be checked every time a new set is put on, so that it will not act as a brake on the beams if too tight. This can be controlled by inserting a large, flat washer, $3\frac{1}{2}$ to 4 in. in diameter, on the spindle between the bearing on the creel stand and the beam-head nut. As long as this washer is loose, it usually turns with the beam, signifying that the bearing is not too tight. By feeling motionless washers with his hands, the foreman can easily determine when a bearing is jammed tight enough to act as a brake on the beam.

Too Many Ends Per Dent

Too many threads through one dent in the slasher comb have a tendency to cause yarn to roll on the loom beam, particularly if the warps are combed in just before a doff. This condition is common in mills which have changed from light to heavy sleys. A dent should never have over five or six threads, and less if possible. Such a crowded condition may cause a warp, perfectly straight from the point it is tied to where it begins to be combed in, to become twisted and to roll up behind the drop wires. The only remedy for this is to install a finer comb with more dents on the slasher.

Special Hook-Up For Ply Selvage

Many weavers make the mistake of running ply selvage through the size box with the rest of the yarn. This is not satisfactory, because the selvage is twice the size of the other yarn and cannot be properly dried unless the remainder of the yarn is overdried. The usual result is mildewed or rusty selvage. It often is objectionable to run ply selvage out of a creel simply to get it under one squeeze roll. Probably the best method is to run it on the front beam of the slasher with the other yarn. This means of course that it will have to be scattered more in the comb on the warper so as to fill up on the beam with the other yarn. After being put in as the front beam of the slasher creel, the ply yarn for selvage is separated and put through a special arrangement of guides and rolls. As can be seen in Fig. 2, the selvage goes through an eye hook attached to the bottom of the hood over the size box, under the rod above the immersion roll, up to the hood again and over a small iron rod, under one squeeze roll, and then on through with the remainder of the warp until it is separated and placed in the

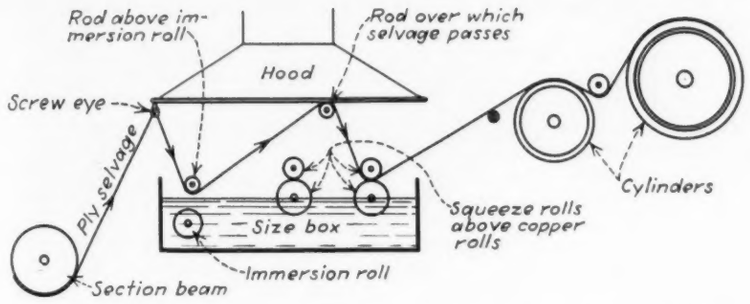


Fig. 2. Special arrangement designed to prevent ply selvage from absorbing too much size compound.

slasher comb. This arrangement increases efficiency greatly, a special feature being that loose ends are eliminated, which ordinarily result from spools running out.

Lumps in Size Box

Cleanliness is an important factor in the successful operation of a slasher room. The size box should be washed as clean as possible every time the size is drained or drawn off and left half full of clean water. If this water is brought to a boil before the machine is again started, the box will heat up and prevent lumps from forming in the size.

Cooking the Size

Methods of cooking size have been discussed time and again from every angle. However, the writer has found the following procedure to give good results:

Using 8 to 10 lb. of compound to 100 lb. of thin-boiling starch, the mixture is stirred cold about 15 min. and then steam is turned on. The temperature is slowly raised for 20 to 30 min. until 108° F. is reached, at which point the size is cooked 1½ hr. It is better to put the gum and compound into the kettle after the mixture gets hot, in order to prevent it from forming a starch-coated ball at the bottom of the container. This condition sometimes develops if the temperature is too low, and no amount of cooking will break the mass. The entire mixture should be cooked the same length of time to aid in the uniformity.

Spare That Spring!

Hayes declares that 90% of wool loomfixers tamper with filling stop motion unnecessarily

By Benjamin F. Hayes

THE filling stop motion on wool looms works under very unfavorable conditions. If the filling came out of the center of the shuttle, instead of coming out at nearly the end, it would be a different story, as we would then have equal tensions in both directions. Furthermore, the greater part of the filling stop motion is on the moving lay, and it is impossible to detect any defect in it by mere observation. Consequently, we must thoroughly understand the operation of this motion in order to determine from the results it gives what is wrong with it.

The average loomfixer knows so little about the filling stop motion that I venture to say that not more than 10% of the motions now operating are working at 100% of their maximum efficiency. To attain maximum efficiency, a motion must stop the loom every time there is less than a complete pick of filling in the shed; and it must, by means of the brake, so stop the loom that when the weaver pulls back the lay the loose broken pick will be free in the shed. Furthermore, the stop motion must not stop the loom at any other time.

The proof of my contention concerning the number of motions which are operating unsatisfactorily is the fact that no more than 10% of all of them are now equipped with the type of friction spring with which they were provided when the looms came from the shop. No loomfixer can get 100% efficiency with any other type of tension spring, although a feeler wire is considered better for the purpose by 90% of them.

But these loomfixers think that this stop motion can stop the loom only when there is no filling directly under the feeler wires. The other 10% say that the loom must be stopped every time there is less than a complete pick in the shed, no matter where the filling may be broken. In other words, it makes no difference whether the filling breaks before or after the feeler wires are reached—and of course the loom must stop if the filling should run out.

I find also that 90% of the loomfixers place the shoe of the filling stop motion back to the limit, and there the shoe remains for all time. The main purpose of this shoe is to raise the feeler wires high enough for the shuttle to pass under them, and many fixers think that that is the only purpose. However, the position of the shoe also determines what part of the feeler wires will contact the filling. Now to say that the feeler wires can contact the filling at the same position on all weaves and all widths of cloth and still give perfect results is ridiculous. With the shoe set to the back all the time, we cannot expect the stop motion to work equally well on plain weaves, twills, and sateens. With plain weave, for example, every warp thread is moving on every pick of the loom; and it will require more energy or pressure to stop the loom on a broken pick with this weave than with any other. The extra pressure is obtained by setting the shoe forward so that the feeler wires will contact the filling nearer to their bottom ends. Looms running on plain weave never stop false; but of course when a change is made to sateen or twill, a few seconds will be required to adjust the shoe again.

Stopping False

False stopping was a troublesome defect when weavers operated only one or two looms and never should have been tolerated. It simply cannot be tolerated today with our automatic looms. Of course, there are times when it is difficult to overcome false stopping. This is particularly the case when we are weavnarrow cloth on wide looms. However, even in these cases we can often set our reed so that the cloth is out of center a few inches. It should be noted that when the loom stops false, it always stops with the eye end of the shuttle on the open end of the shuttle box. This is because there is more slack filling when the shuttle comes in this direction. We can often take up some of this slack by moving the reed over toward the side where the shuttle eye goes first into the box.

But there are other causes of false stopping, the chief of which is the failure of the feeler wires to go deep enough into the slot before contact with the knock-off is made. When this fault is the basic one, many loomfixers nevertheless endeavor to overcome false stopping by using a large amount of drag in the shuttle. This causes considerable filling breakage, and it is far better to loosen up the main casting of the filling stop motion and drop it down until the feeler wires are near the bottom of the slot when the knock-off dagger is resting on the main casting. Of course, when we move this main casting, we must make all our adjustments over again, for when we drop the main casting we also drop the shoe and other parts. On some occasions I have had to make the feelerwire slot deeper.

No doubt the object of most loomfixers in replacing the correct pressure spring in the stop motion with a feelerwire pressure spring is to prevent false stopping; but as bad as false stopping is,

it is more costly and troublesome to have broken picks.

An incorrect spring can also be blamed for the feeler wires tearing the cloth, as sometimes happens on a plain weave. To overcome this difficulty an ingenious loomfixer once invented an angle iron about 2 in. wide to be fastened onto the main casting of the stop motion and to extend forward so as to lie between the cloth and the feeler wires; but it proved expensive by smashing shuttles and, like many other inventions, was not needed. This spring I have talked so much about is stout enough to prevent the feeler wires from tearing the cloth; and, if its adjusting screw is set correctly to relieve the pressure when the feeler wires are entering the slot, it will never cause false stopping. Also, it will carry all broken picks down into the slot.

Imitating Hand Machines

Copying fine work produced in Europe on common American-built ribbers

By Paul W. Niles

THE boss wanted to make something like a sample he had shown me. This was, I believe, a French handmade coat, a short three-button jacket type. The hand machine on which it was made was probably of the type in which each needle can be put into or out of work by hand and can be arranged for almost any sort of pattern.

I had a Brinton circular ribber that could be experimented with. If it had been a dress-goods machine of twenty feeds with wheels for pattern, the job would have been much simpler. As it was, I had nothing but a set of movable cams and long-latch needles.

The imitation I made, which follows the original quite accurately, is shown in Fig. 1. The average knitter will note at once that it has two tuck stitches, but he will be less likely to recognize the fact that a long-latch cylinder needle is responsible for drawing the stitches together in the form of a half circle. The cylinder is 2 x 2—that is, two needles in and one out—and the dial cams are set to hold two stitches, the long latch coming between the two cylinder needles.

For production on an eight-feed machine, hold two dial stitches and cast off two. Changing the single color yarn to another feed will materially alter the pattern. For example, the fabric as illustrated has the color on the second of the tuck stitches. If it were changed to the first tuck, an entirely different effect would be produced.

The only difficulty a knitter will have with this style is in securing the correct width of fabric, as these tuck stitches will increase the width several inches beyond that which the machine has probably been affording on plain stitch. Unless two sizes can be cut from one width, the waste may be excessive.

For Light-Weight Coats

The sample shown in Fig. 2 is suitable for a light-weight coat, knit slack with about half the needles out of the dial and cylinder. It has a lace-like appearance, and again the pattern effect can be changed by simply changing the color to another feed. A change in the effect could also be made by the use of more tuck stitches. For the specific effect shown, only every third dial is used, and there are no long latches in the cylinder.

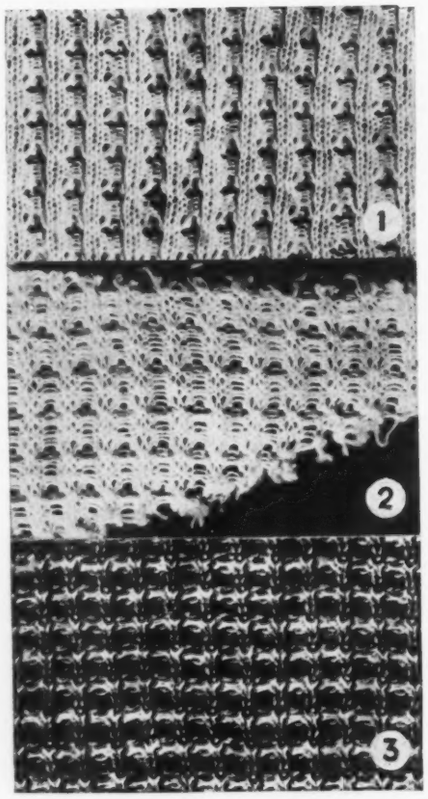


Fig. 1. Imitation of a French handmade coat fabric

Fig. 2. Light-weight coat fabric

Fig. 3. Worsted and cotton fabric with crinkly effect

The worsted and cotton sample shown in Fig. 3 is the same as the all-cotton one in Fig. 2 except that the dial needles are pulled back a considerable distance to give the crinkly effect.

A knitter who has dials with two sets of cams and two sets of needles can improve on all three of the patterns shown by means of a simple chain arrangement. For instance, suppose we are to arrange the dial needles to produce a panel, or raised panel effect, 3 in. wide and spaced at intervals of 6 in. On a ten-needle-to-the-inch machine we must set 30 long needles to work from the back set of needles, set the next 60 needles to work regular, and so on around. If the needles do not divide up correctly, we can add or take out a needle here and there until the repeat is continuous. The chain can be set up with the right number of high and low links to give a perfectly square checkerboard effect or any other of a great variety of patterns. Most knitters will readily see the possibilities in producing fabrics of the type illustrated by means of needles out, long-latch needles, and two sets of dial cams

Shaped Coats

The idea of a shaped coat is growing. A fine 10-cut worsted coat with a stripe, or even with fancy stitches, could be made on a Wildman striper. There is no way to hold dial stitches on this machine; but no-cast-off straight knitting to bring out the tuck stitch could be arranged, with four feeds left to knit plain and the striper used to throw out feeds for the shaping. Some of the patterns made this way are of distinctly jacquard calibre.

The spring-needle men have been rather slow in getting into the porous-knit game, in spite of the fact that they have an excellent starting point in the cut-presser wheel, which will do a lot of things with colors. When the cotton-underwear trade disappeared (it has recently shown signs of a revival), many of the underwear mills turned to knit coats; but for some reason they kept their spring-needle machines on plain-stitch work. I proved to my own satisfaction that there was no necessity for this by teaching tricks to a Tompkins spring-needle machine for collars. If this machine could have provided a separation thread for a self-finish, I might be using it today.

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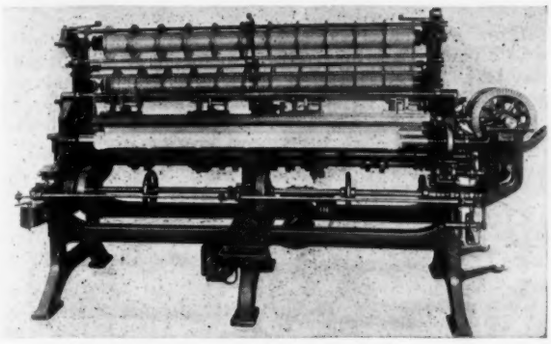
Columbia's Textile Courses

Columbia University offers five evening textile courses, under direction of H. R. Mauersberger. Registration for these courses begins Sept. 19. Classes begin on Sept. 24. A special opening night for the general public and students will be held Sept. 30 in Room 306, School of Mines. The latest sound and silent films on rayon, wool, cotton and silk will be shown. There is no admission charge. A new course in woolen and worsted manufacture will be given for the first time this fall by Werner von Bergen, chief chemist of the Forstmann Woolen Co., Passaic, N. J. Other courses in manufacture of cottons, rayons, silks, as well as woven and printed fabric design, are also offered.

NEW MACHINERY & PROCESSES



Milanese and Tricot Machines

When, over a year and a half ago, the new high-speed milanese and tricot warp-knitting machines developed by Emil Wirth, of Germany, were first announced abroad, TEXTILE WORLD carried as complete a description of them as the information available at the time permitted. Recently Robert Reiner, Inc., has been made sole American sales agent for these machines, and several of them are now on demonstration at the Reiner plant in Weehawken, N. J. At this time, therefore, it is possible to verify the original description and to offer some additional details.

The milanese machine is designed to permit a speed of 200 courses per minute without danger of frayed yarns. The speed-permitting features include more solid construction, shortened levers, more accurately shaped Dawson wheels, and an improved arrangement of needles and sinkers. The spring-beard needles, which are placed vertically, are cast three together in leads which have rabeting grooves to facilitate accurate alignment. The warp beams are located above the needles to make the knitting mechanism more accessible and the threads more readily observable. To speed production, yarns are transferred from back to front (and vice versa) six at a time.

Another milanese machine, with two needle bars inclined toward each other, produces a patented double fabric.

The tricot machine, which is illustrated herewith, operates at speeds as high as 375 to 400 courses per minute on suitable material and is designed for simplicity of operation. Unvarying density of fabric has been sought by a synchronized feeding and take-up device and by improved yarn let-in and fabric roll-up features. Guide bars are tied in with pattern wheels to insure precision of movement in laying threads. New shaft equipment provides easy running and low power requirements.

For further details and photographs of all machines, the reader is referred to the original article in the January, 1935, TEXTILE WORLD, page 94. A high-speed warper suitable for preparing beams for these machines, and also marketed by Reiner, was described on page 102 of the July, 1936, issue.

Worsted Ring Frame

Some confusion seems to have been caused by a statement in our July issue, page 101, to the effect that the new Parawind large-package ring frame for worsted, now being introduced to this country by Atkinson, Haserick & Co., Boston, is suitable for a range of 48s to 70s. These figures referred to the qualities of stock, rather than to the counts of yarn. The machine is recommended for the production of knitting and weaving yarns up to and including 48s count.

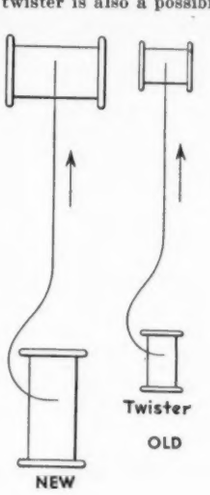
Warp-Stop Motion

I. A. Hall & Co., 30 Hamilton Ave., Paterson, N. J., agents for Grob & Co., Ltd., Horgen, Switzerland, announce an electric stop motion recently developed by the latter concern. The following advantages are listed for the system: It serves as a false reed, replacing the lease bars, is easily adjusted to the warp, and can be moved with the heddles without difficulty; the heddle rods are maintained at their distance by means of a mobile sustainer, allowing the drops to fall readily for the whole width of the warp and preventing empty spaces; the depth of the drops renders the stop motion insensitive to loose threads; the drops have a highly polished eyelet; the number of rows may be increased simply by adding shafts.

Large-Package Winding and Twisting

Winders, 5B doubler-twisters, and twisters made by Atwood Machine Co., Stonington, Conn., are now designed to handle packages of double the capacity of those that were formerly standard. The 5B will handle bobbins up to 7 in. in length and the winders and twisters take packages in proportion so that the work flows from one skein to one bobbin, from bobbin to bobbin, etc.

Among the advantages of the large-package system are the following: less doffing, as the package takes 50 to 100% longer to fill; less handling; fewer packages and bobbin boards; cone-size package; fewer knots; balanced package size from skein to knitting or weaving. Warping, quilling, or knitting direct from the package as it comes from the 5B or twister is also a possibility.



Full-Fashioned Machine Parts

Replacement parts for full-fashioned hosiery knitting machines are now being manufactured by Thomas & Skinner Steel Products Co., Indianapolis, Ind. The line includes sinkers, dividers, jacks, snapper springs with or without holes, and jack axles. The company also reconditions wornout rollers with Thomas & Skinner "Long-Life" tires.

Bobbin-Box Hoist

Transfer of bobbins from filling boxes to the feed hoppers of bobbin-stripping machines is quickly accomplished with the bobbin-box hoist announced by Terrell Machine Co., Charlotte, N. C. Less than 2 min. is required to raise, dump, and lower a filling box; and the operator of the bobbin-stripping machine is thus able to operate more effectively.

The hoist is equipped with ¾-hp. motor, automatic stops at each end of its travel, and starting levers on each side. Where several bobbin-stripping machines are located side by side, the hopper is designed to serve all machines, an assistant spreading out the bobbins so they will be within reach of the machine operators.

Large-Package Mule

The advantages of large packages have been incorporated in the new woolen mule developed by Johnson & Bassett, Inc., Worcester, Mass. Doffing time, number of knots, and handling in subsequent operations are reduced by spinning on a bobbin 13½ in. long, and the mule has been redesigned to handle such a bobbin in a mechanically efficient manner. In one mill handling a rag mixture, bobbins on the old mule held 2¼ oz. of yarn, while bobbins on the new mule, with the same gage, hold 6⅓ oz. In another trial installation, weight of yarn on the bobbin was increased from 1½ oz. with the old equipment to 9⅓ oz. with the new.

Where speed is high, ball or roller bearings have been used in constructing the new mule. At points of lesser wear, a type of bearing is employed that will run for several months without attention. Due to the increased load and strain incident to the spinning of large packages, the company employs Z metal at many points. This metal is a heat-treated carbon steel developed to increase strength.

Business News

Torrington (Conn.) **Co.** has appointed E. G. Paules, 343 Bendix Bldg., 1206 Maple Ave., Los Angeles, Cal., as its Pacific Coast representative on knitting needles.

T. C. Entwistle Co., Lowell, Mass. Vice-president Clarence R. Howe is in England on a business trip.

U S Bobbin & Shuttle Co., Manchester, N. H., has added Clifford N. Beck, a graduate of New Bedford Textile School, class of 1936, to its staff.

Augusta (Ga.) **Mill Supply Co.** has begun operations under the management of E. J. Hanahan.

Geigy Co., Inc., New York, represented in Canada by **T. W. Wardlaw & Son**, 23 Scott St., Toronto, has purchased a building at 9 Front St., E. for use as a warehouse, laboratory, and office.

Sonoco Products Co. of Canada, Ltd., Brantford, Ont., has made R. J. Fletcher a director and manager of the Canadian branch.

Universal Winding Co., Boston. Vice-president E. O. Smith has spent several months in visiting England, France, Switzerland, and Russia on a trip combining business and pleasure.

Arthur D. Little, Inc., Cambridge, Mass., has added Horace N. Lee to the staff. Mr. Lee has had twenty years of experience in the microscopy of textiles and will be available to manufacturers for the study of textile problems.

Whitinsville (Mass.) **Spinning Ring Co.** has appointed H. R. Brock, formerly with Martha Mills, Thomaston, Ga., as southern representative.

John Falkner Arndt & Co., Philadelphia advertising agency, has added to its staff Frank Strockbine, formerly advertising manager of Proctor & Schwartz, Inc., Philadelphia, manufacturers of textile drying machinery.

Textile Specialty Co., Greensboro, N. C., is constructing an addition to its present plant.

Whitin Machine Works has appointed A. B. Moss, Jr., formerly assistant agent of Merrimac Mfg. Co., Huntsville, Ala., and assistant manager of Bemis Bro. Bag. Co., Talledega, Ala., to a post in its sales-and-survey department, with headquarters at Charlotte, N. C.

Sinclair Refining Co., has placed G. C. Wilson, industrial sales representative in western North Carolina for a number of years, in charge of the entire State of South Carolina, with headquarters at Columbia, S. C. He is succeeded in North Carolina by C. C. Nix.

American Cyanamid & Chemical Corp. has appointed George F. Echelber, formerly manager of Grasselli Chemical Co., Charlotte, N. C., as manager of sales in eastern North Carolina and Virginia. His headquarters will continue to be Charlotte. G. Ray Armstrong, formerly manager of Victor Chemical Co., Nashville, Tenn., is to represent the company in Tennessee, Louisiana and Mississippi. American Cyanamid & Chemical Corp. is doubling the size of the Charlotte plant and plans to add Florida and Arkansas to the southern territory, according to Paul Haddock, southern sales manager. An additional warehouse is to be opened in Chattanooga, Tenn.

THE PERSONAL PAGE

Warren R. Williams, vice-president of Sanford (N.C.) Cotton Mills, has been elected president, succeeding **R. P. Dicks,** who sold his interest in the mill and resigned. **W. R. Hartness** was made vice-president and E. M. Underwood, secretary and treasurer.

George Park, treasurer of George Park Mfg. Co., Dexter, Me., has sold the controlling interest in the concern to Dumbarton Woolen Mills and retired after more than 50 years in the woolen business. **H. C. Mountain,** treasurer and agent of Dumbarton Woolen Mills, will serve in the same capacity at George Park Mfg. Co.

Henry V. Greenough, of Ludlow Mfg. Associates, Boston, has been elected a director of Nashua (N. H.) Mfg. Co.

Charles Nazarro, president and treasurer of Radiance Piece Dye Works, has retired from active participation in the business. **Arthur Nazarro,** his son, will run the concern, the name of which has been changed to Trojan Piece Dye Works.

Roy C. Nelson has been appointed resident manager at Assabet Mills, Maynard, Mass., of American Woolen Co., succeeding **H. C. Templeton,** who, as noted, is now general manager of the company. **Howard Herbert** has taken over Mr. Nelson's old position as assistant manager.

P. A. Gwaltney, general superintendent of Marlboro Cotton Mills, McColl, S. C., has been elected president to succeed **D. K. McColl,** who was named chairman of the board of directors.

K. E. Thierfelder has resigned his position as vice-president in charge of production at Se-Ling Hosiery Mills, Nashville, Tenn., effective Oct. 1. He will be succeeded by **J. H. Callicott.**

B. H. A. Hoffman has been appointed treasurer of International Silk Guild, Inc., New York, and will also continue as treasurer of Raw Silk Importers, Inc.

Edward S. Pratt, of Concord, Mass., was elected president, and **William R. Dewey,** of Weston, Mass., secretary-treasurer at the organization meeting of the board of directors, July 23, of Icard (N.C.) Mfg. Co., which was recently formed to take over and operate the Icard plant of Burke Cordage Co., and its predecessor, the Icard Cordage Co.

John Washington Graham and **Frederick Philips Wood** have been added to the board of directors of Edenton (N.C.) Cotton Mills, the latter being the son of a former president.

J. M. Mackie has been appointed president of Canadian Converters Co., Ltd., Montreal, Que., to succeed the late J. Harvey Roy. **T. R. Rennie** was appointed to the dual position of vice-president and general manager.

Edward W. Smith has become superintendent of Central Falls (N.C.) Mfg. Co., one of the Burlington Mills group. He was formerly with Berkshire Fine Spinning Associates and Wauregan Mills.

Alfred Leiss, for the last 14 years loomfixer for Rossie Velvet Co., Willimantic, Conn., has been elected treasurer of the newly-formed Leiss & Sussman Velvet Co., Willimantic. **Morris Sussman,** Willimantic business man, is president of the new corporation. **Arthur Kruck,** a graduate of the Philadelphia Textile School, has been named superintendent.

Otto C. Hamel, vice-president and treasurer for a number of years of Meinig Hosiery Co., Reading, Pa. has severed his connections with that firm and associated himself as general superintendent with Bethayres (Pa.) Knitting Mills.

F. S. Nichols, formerly of Judson Mills, Greenville, S. C., is now general manager of Abbeville (S.C.) Cotton Mill.

L. A. Hamer. general superintendent of Startex Mill, Tucapau, S. C., has resigned.

Patrick P. Baxter has been named superintendent of River Woolens, Inc., Leicester, Mass.

Sydney D. Wilson has been appointed superintendent of Cocheco Woolen Mfg. Co., East Rochester, N. H. He was formerly with Hayward Woolen Co., East Douglas, Mass.

Henry Butterick is superintendent of Talcott Bros. Co., Talcottville, Conn.

R. B. Lewis has been appointed sales manager for the thread division of Standard-Coosa Thatcher Co., succeeding **Geo. H. Greene.** Mr. Lewis will make his headquarters in Philadelphia.

J. P. Margeson, Jr., who recently was appointed general manager of the manufacturing division of Marshall Field & Co., has been elected a vice-president of that company, it is announced. Mr. Margeson joined the organization in November, 1935, as general merchandise manager and assistant general manager of the manufacturing division.

William Muir has been appointed assistant manager of the Champlain Mills of the American Woolen Co. at Burlington, Vt. He was formerly superintendent of Cleveland (Ohio) Worsted Mills.

W. J. Carter, formerly vice-president Burlington Mills, has been elected vice-president of S. Slater & Sons, Inc., and will divide his time between New York and Greensboro, N. C.

R. Samson Low, formerly with Amoskeag Mfg. Co., has joined the staff of Wellington Sears Co., New York. He will concentrate on new and original style work in the fabric field.

T. Higo has been appointed director of the Yokohama Silk Conditioning House, succeeding **Gonshiro Haga,** it is announced from Japan.

D. S. Menzies has been elected president of the recently formed Sterling Hosiery Mills, Hickory, N. C., other officers being **J. J. Dell,** vice-president and **Sterling Menzies,** secretary-treasurer and general manager.

Paul Hyde Bonner has resigned as merchandise manager of Stehl & Co., Inc., New York, and plans to devote his time to writing.

Adolf Jaeckli has resigned as vice-president in charge of constructions at Schwarzenbach, Huber Co. **Eugene Hardmeyer,** who was **Mr. Jaeckli's** assistant, has taken over his duties. Mr. Jaeckli was connected with the firm for 39 years.

W. H. Gibson, Jr., has resigned as superintendent of Jennings and Mansfield Cotton Mills, Lumberton, N. C., to accept a similar position with Cotton Mill Products Corp., Mobile, Ala.

J. F. Ford, formerly assistant superintnedent of Tucapau (S.C.) Mills, is now superintendent of the Clinton, (S.C.) Cotton Mills.

Edgar Holmes has resigned as wool buyer for Stillwater Worsted Mills, Harrisville, R. I.

L. E. Cromer has been made purchasing agent at Greenwood (S.C.) Cotton Mills.

Arthur C. Haynes, of Canton, China, has been appointed to professorship in the department of textile chemistry at North Carolina State College, Raleigh, N. C. He is a graduate of Brown University, did special work in analytical chemistry at Southern California.

H. D. Arnold, of Fall River, Mass., has been elected permanent traffic manager of Textile Traffic Association, Providence, R. I. He was traffic manager for 23 years at American Printing Co., Fall River.

Frank R. Appelt, Torrington, Conn., president of Warrenton Woolen Company, has been elected a director of Connecticut Power Co.

C. Chester Bassett, former assistant sales manager of American Bemberg

Textile Calendar

Weavers Division, S.T.A., Spartanburg, S. C., Sept. 19, 1936.

Northern and Southern Carolina Division, probably at Greensboro, N. C., Oct. 3, 1936.

Textile Section, National Safety Council, annual congress, Atlantic City, N. J., Oct. 7 and 8, 1936.

Carders and Spinners Division, S.T.A., Spartanburg, S. C., Oct. 10, 1936.

Committee D-13, A.S.T.M., fall meeting, New York, Oct. 14 to 16, 1936.

Master Mechanics Division, S.T.A., Spartanburg, S. C., Oct. 23, 1936.

Coordination meeting of cotton textile industry, New York, Oct. 27, 1936.

Tenth annual meeting, Cotton-Textile Institute, New York, Oct. 28, 1936.

Carolina Yarn Association, fall meeting and golf tournament, Carolina Inn, Pinehurst, N. C., Oct. 29 and 30, 1936.

Eastern Carolina Division, S.T.A., location to be announced, date in late November.

American Society of Mechanical Engineers, annual meeting, New York, Nov. 30 to Dec. 4, 1936.

National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York, Nov. 30 to Dec. 5, 1936.

American Association of Textile Chemists & Colorists, annual meeting. Providence, R. I., Dec. 4 and 5, 1936.

Gaston County Division, S.T.A., probably at Gastonia, N. C., in December before middle of month.

Twelfth Southern Textile Exposition, Textile Hall, Greenville, S. C., April 5 to 10, 1937.

Corp., has become associated with Cleveland Cloth Mills in a sales capacity, this marking his first connection with the fabric field.

J. **W. Emory,** manager of the Emory Hosiery Finishing plant, Hickory, N. C., has moved to Hickory from Durham, N. C., where he will make his home in the future.

C. **H. Lockman** has become superintendent of the Jennings Cotton Mills, Lumberton, N. C. Mr. Lockman was formerly with the Cowpens (S. C.) Mills.

T. **O. Rudder** is now superintendent of the Stevenson, Ala., unit of the Avondale Mills.

Billy Gudenrath, of Huntsville, Ala., employed by the Pepperell Mfg. Co., in Lindale, Ga., has accepted a position with the W. R. Grace Co. of New York, and sailed Aug. 21 for Chile to take up his new duties.

Wilton Todd, manager of the Kendall mill at Paw Creek, N. C., has been transferred to the managership of the Mollohon mill at Newberry, S. C. **W. P. Johnson,** assistant manager of Mollohon mill, will succeed him.

John A. Law, president of the Saxon Cotton Mills, Spartanburg, S. C., has accepted chairmanship of a special committee organized by the U. S. Chamber of Commerce to study prices in distribution, especially with relation to the Robinson-Patman Act.

J. T. Byrum, formerly of Salisbury, N. C., is now superintendent of the Winville Corp., Lawrenceville, Ga.

M. R. Cranford, Clemson textile graduate of 1933, has resigned as instructor in textiles at Clemson Textile School to accept a position with Muscogee Mfg. Co., Columbus, Ga.

W. E. Tarrant, Clemson textile graduate of 1927, has accepted the position of assistant professor of weaving in Clemson Textile School. For the last six years, Mr. Tarrant has been head of the weaving division of the Textile School at Auburn (Ala.) Polytechnic Institute.

C. F. McDade, formerly overseer of weaving at the Lone Star Cotton Mills of El Paso, Texas, is now superintendent of the J. W. Saunders Cotton Mill, plant No. 2, Magnolia, Miss.

C. H. Lockman, superintendent of Cowpens (S. C.) Mills, has resigned to accept a similar position with Jennings Cotton Mill, Lumberton, N. C.

Louis R. Myers, of Little Rock, Ark., has been elected president Morrillton (Ark.) Mills, Inc. **Frank M. Swirles,** of Chicago, has been made vice-president and **Charles V. Hoke,** of Little Rock, is secretary-treasurer and general manager.

A. A. Dawkins has resigned as superintendent of Jennings Cotton Mill, Lumberton, N. C.

T. O. Rudder has been made superintendent of the Stevenson, Ala., plant of Avondale Mills.

J. W. Hames, of Stevenson, Ala., is now superintendent of Shelbyville (Tenn.) Mills.

E. G. Spier has been tranferred from the Alta Vista plant of the Burlington Mills Co. to the superintendency of their plant at Roanoke, Va.

Henry Burrus, Jr., who has been connected with the Martha Mills, textile division of the B. F. Goodrich Co., Thomaston, Ga., has become associated with the Carolina Cotton & Woolen Mills, Spray, N. C.

Obituary

Walter **F. Brewster,** aged 68, manager of the cotton goods division of Pacific Mills in New York, died on Aug. 14 in a hospital at Stamford, Conn., after an illness of several months. Mr. Brewster started his career with Minot, Hooper & Co. in 1884. Later he was with Denny, Poor & Co. and then became a member of the firm of Edward E. Poor Co. In 1908 he joined Lawrence & Co., was admitted as a junior partner in 1918, and subsequently became sales manager at Lawrence & Co. for all Pacific Mills' cotton lines. When Pacific started to sell direct in 1925, Mr. Brewster became sales manager. In 1929 he was made manager of the cotton goods division. He was a former president of the Association of Cotton Textile Merchants and of the Textile Export Association.

Henry Maxwell, aged 74, treasurer of Deering, Milliken & Co., and for 45 years associated with that company and its predecessor the non-incorporated firm, died Aug. 24, at his home in Hackensack, N. J. Mr. Maxwell was an outstanding figure in the cotton goods field. W. Ray Bell, president of the Association of Cotton Textile Merchants, praised him as "universally beloved by his associates and respected by all market elements".

Joseph T. Kenney, aged 59, president of Sharp Mfg. Co., New Bedford, Mass., from 1910 until its liquidation several years ago, died at his New Bedford home Aug. 20.

Ernest L. Morrill, aged 67, a former superintendent and agent of the Pepperell Mfg. Co. at Biddeford, Maine, died at his summer home at Hills Beach, Me.

H. **C. Coleman,** aged 70, vice-president of Wildman Mfg. Co., Norristown, Pa., died at his summer home in Colebrook, N. H., on Aug. 8.

B. **L. Angle,** aged 67, vice-president of Angle Silk Mill, died Aug. 5 at his home in Rocky Mount, Va.

Henry P. Moellering, aged 73, secretary-treasurer of New Havey Silk Mills, Ft. Wayne, Ind., died recently.

Horace Bushnell Cheney, aged 68 formerly secretary-treasurer of Cheney Brothers, South Manchester, Conn., died Aug. 15 as a result of injuries received in an automobile accident at Santa Fe, N. M., on Aug. 12. Mr. Cheney was chairman of the committee on legislation of the Silk Association of America for many years. He became acquainted in this capacity with leading legislators of the country and was an authority on tariff questions pertaining to his industry. In recognition of his contributions on the subject Human Engineering, he was awarded the Gant Gold-Medal by the Society of American Engineers, in 1934, for distinguished service in industrial management. He was particularly interested in jacquard design and collaborated in writing the book "A Romance of Design."

James Robert Moore, aged 76, died at his home in East Marion, N. C., Aug. 23. He was connected with the Henrietta mills at Caroleen for 20 years and served as secretary-treasurer of the Alexandria Mfg. Co., of Forest City until four years ago.

W. M. McLoud, aged 54, superintendent of two cotton mills at Cherryville, N. C., and a third at Statesville, N. C., was killed in an automobile accident near Laurinburg, N. C., Aug. 29.

James Matheson McCallum, aged 42, overseer of the yarn and finishing departments of the Hampton Co. at Easthampton, Mass., died Aug. 29. He was a native of Worcester and had been employed by the company for many years.

M. D. Long, aged 83, secretary-treasurer of Asheville (N.C.) Cotton Mills, died Aug. 17.

Jacobs Claywell Seagle, aged 65, president of Caldwell Cotton Mill Co. and Hudson Cotton Mfg. Co., and vice president of Whitnel Cotton Mill Co., Moore Cotton Mills Co. and Lenoir Cotton Mill, died Aug. 21, at his home at Lenoir, N. C.

Clarence Morton Whitman, head of Clarence Whitman & Sons, Inc., New York, aged 60, died Sept. 11. He was also treasurer of Stevens Mfg. Co., and a director of Esmond Mills and Wilkes-Barre Lace Mfg. Co.

William Halliwell, aged 79, who retired in 1933 after 32 years as agent of Lawton Spinning Co., Woonsocket, R. I., died Sept. 2.

William W. Windle, aged 65, president of W. W. Windle Co., Millbury, Mass., died at his summer home in Nantucket Sept. 8.

John McKenzie Hardison, aged 76, for a number of years secretary-treasurer of Wade Mfg. Co., Wadesboro, N. C., died recently.

Albert Gill, aged 65, former superintendent of Colwell Worsted Mills, and later connected with Eagle Worsted Co., both of Providence, R. I., died on July 31.

J. George Rick, Jr., aged 48, superintendent of Kurstein & Rick, Reading, Pa., died on Aug. 20.

Daniel S. Pritchett, aged 60, superintendent of Georgia-Kincaid Mills, No. 1 plant, Griffin, Ga., died recently.

Charles L. Laub, superintendent of Fuld & Hatch Knitting Co., Cohoes, N. Y., died Aug. 20.

Fred Hird, formerly assistant superintendent at Davis & Brown Woolen Co., Uxbridge, Mass., died July 23, at St. Petersburg, Fla.

Theodore C. Hazard, textile industry sales manager of the Taylor Instrument Cos., Rochester, N. Y., died Sept. 6, aged 48 years.

J. B. Broadnax, aged 59, overseer of spinning, Springs Cotton Mills, Fort Mill, S. C., died Aug. 29.

TEXTILE WORLD'S

Cotton Digest

W. RAY BELL, president of the Association of Cotton Textile Merchants of New York, performed an important service for his industry when he released a statement late last month demonstrating that relative prosperity has apparently returned this year to the cotton textile industry. His analysis of the reasons for this return is a sound one. Certainly, the passing of the processing tax, the elimination of price qualifying clauses, and the return of a more normal situation in the raw cotton market are all important factors in this connection. Confidence in the general adherence of producing units to maximum operating schedules of 80 hours per week reflects great credit upon the industry itself. Willingness of the consuming public to purchase goods in volume at current levels, plus the factor of shortage of reserve stocks, are potent bullish forces. More than all else, Mr. Bell points out, are the evidences of confidence, as measured by actual sales consummated.

The recovery in this branch which started in May has been remarkable. Best of all, it appears to be "only the beginning."—*Editor.*

Prosperity Returns to Cotton Industry

Domestic cloth markets are improving at a pace which tends to prove the "conviction that the year 1936 will mark the return of relative prosperity to the cotton textile industry," recently declared W. Ray Bell, president of the Association of Cotton Textile Merchants, in a survey of trade conditions.

There was a "solid foundation" for progress, he emphatically asserted, in active consumer demand, and, in contrast with the experience of recent years, summer activity in the primary cloth market has reached heights approximating normal. He added that most signs point to the best autumn in years.

"For the first six months of 1936," he said, "cotton textile operations, measured by active spindle hours were 13.85% greater than for the like period of 1935. Total spindle-hour activity was 43,248,000 hours of work against 37,984,000 hours last year.

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Sanforizing May Affect Gray Goods-Constructions

New or additional standard constructions for gray goods of various kinds will be developed within the next few years, according to some observers, because of the steady increase in the yardage of cotton goods being sanforized each year. Generally speaking, the plan heretofore has been to select the width and weight sanforized goods desired and work backward calculating what the original cloth would be. However, during the last year there has been considerable interest in sanforizing convertible materials such as broadcloths, lawns, voiles, sheetings, print cloths, etc. Research has shown that invariably a fabric is needed wider than the standard, lighter in weight and usually lower in count. Altogether, a new construction develops, and often the lower count makes up for cost of the yardage lost in shrinkage.

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Canvas Goods Producers Report Business Better

Canvas goods manufacturers have had an exceptionally good year with business about 30% ahead of last year, according to a report brought to the Canvas Goods Manufacturers Association of Greater New York by Frank Stevens, director, and Harry Adams, general counsel, who recently returned from a meeting of the National Association of Tent & Awning Manufacturers held at Chicago.

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New Bagging Fabric

A cotton bag in which to package raw sugar has been developed by technologists of the Federal Bureau of Agricultural Economics in cooperation with the textile school of North Carolina State College. Tests showed that the new bag could withstand an average of 1,700 drops before breaking when dropped slightly more than five feet. Jute bags as are commonly in use can withstand only 185 drops. It is hoped that these cotton bags will replace jute bags used in shipping Hawaiian raw sugar. This would provide an outlet for 10,000 bags per year.

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Georgia Operating Executives to Meet

The fall meeting of the Textile Operating Executives of Georgia will be held Saturday morning, Sept. 19, at the Georgia School of Technology in Atlanta. Slashing and weaving problems will be discussed. Harry Purvis, of Chicopee Mfg. Co. of Ga., will lead the slashing discussion, and Allen Jones, of Muscogee Mfg. Co., will conduct the weaving forum.

Rust Cotton Picker

(*Continued from page 68*) that can be eliminated in the cleaning process or in the picker room at the mill. Mills as a whole prefer natural bloom of cotton *with leaf* to clean cotton which is blued or grayed due to long exposure to weather. With the mechanical picker cotton will not deteriorate in the field while waiting to be picked.

The question has been raised that mechanically picked cotton, picked at the rate of one-half bale per hour, would go to the gin still retaining its seed moisture, would be ginned before dry and as a result the fiber would be gin-cut. This question has already been answered, for most modern gins are now equipped with dehydrating plants or vertical dryers which remove moisture from seed cotton before it is ginned. It is estimated that cotton which has gone through this drying process at the gin has an increased monetary value of from $2 to $7 per bale on account of its resultant smoothness and quality.

Figuring the actual savings in dollars and cents, the cotton producer can no more afford to refuse to use labor-saving devices in the handling of his crop than the cotton mill executive can afford to overlook new textile machinery developments. Until the mechanical cotton picker is tried out for several seasons, operating day after day under farm and plantation conditions, operated by unskilled mechanics (negroes mostly), one can only theorize as to its possibilities. It is safe to presume, however, that it will not create a violent economic upheaval.

Actual farm labor—share croppers and tenants—will not be displaced. The sufferers will be the seasonal help, hired by the day, as supplementary labor. These laborers have jobs in town during the rest of the year—they will make them year-round. They will stay in the Jones' kitchen; they will continue to work the Smith garden; they will nurse the Davis children; they will drive the Johnson car.

We shall produce more cotton at less cost than any other nation; we shall maintain high living standards on the farm; cotton will still be king.

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Prices and Activity

Key cotton prices of Sept. 1 and a month ago contrasted with those of the last two years follow:

	Sept. 1, 1936	Aug. 1, 1936	Sept. 3, 1935	Sept. 4, 1934
Spot Cotton N. Y.	11.87	12.89	10.65	13.15
Ditto, high previous mo.	12.89	13.65	12.00	13.95
Ditto, low previous mo.	11.70	12.49	10.65	13.10
10s hosiery cones	.24½	.25½	.26½	.30
10s/2 carded skeins	.24½	.25½	.27	.30
20s/2 carded peeler warps	.27½	.29½	.30	.33
60s/2 combed peeler warps	.55	.57	.54	.61
60s/2 mercerized cones	.68	.68	.70	.73
37 in., 3-yd. drill	.8½	.8½	.9	.10
38½-in. 64x60s	.5½	.6	.6½	.7½
36-in. 4-yd. 56x60s	.7½	.7½	.6	.7½
Denim, 2.20s	.13	.13	.15	.15

Statistics of particular interest to cotton manufacturers, showing July operations and the raw material situation:

Spindle activity	119.8%	capacity, or
	7,859,348,920	spindle hours
Cotton consumed	603,203	bales
Cotton exported	156,262	bales
Cotton imported	20,305	bales
Cotton ginned to Aug. 16	208,327	bales

June operations for comparison:

Spindle activity	111.0%	capacity, or
	7,319,892,450	spindle hours
Cotton consumed	556,323	bales
Cotton exported	287,336	bales
Cotton imported	12,462	bales

Markets Turn Active in September

Early September witnessed a brisk and advancing market in both yarns and cloth following the cotton rise based on the sharply curtailed forecast.

The gray cloth market during August was generally dull although prices in most instances held fairly well. Steadiness was considered an indication that the market was still sound despite adverse influence of the early high cotton crop estimate, seasonal slackening, falling off of retail buying due to drought conditions, and high mill production. Offsetting some of these unfavorable factors, however, were unfilled orders, Government buying and confidence that fall business will be good.

Probably more yarn was shipped during August than any month since the summer of 1933. Buying of single combed yarn remained for the most part more active than ply numbers, but the number of unfilled orders for the latter is by far the larger. There was not as much interest in carded yarns as expected. Shipments of staple cotton from the new crop to the Gastonia area and other sections tended to relieve the shortage which had been bothering combed yarn spinners for several weeks.

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Industry Notes

A cotton research foundation has been started in Memphis, Tenn., to find new uses for cotton and to encourage increased use. More than 150 representative Memphis business men have promised their support and have pledged $5,000 for organization work. Everett Cook, cotton dealer, is temporary chairman, David Cohn, Mississippi author, has offered his services to the group and has suggested a plan for financing.

Bliss Fabyan & Co. held a 3-day conference for its sales force at its New York office early this month. S. Robert Glassford, president of the company, opened the sessions with a talk on the use of intelligence trained by experience. He also stressed the need for maintenance of flexibility in selling house business.

Fall River, Mass, business men are more optimistic this month with the actual and prospective starting up of several idle plants and with probability that a new textile enterprise, said to be off-shoot of a European firm, will settle in Fall River.

A new idea in sheet making is being sponsored by Nashua Mfg. Co. which will be emphasized in its forthcoming promotion campaign. A fast-color thread running through the sheet at the proper distance from the foot of the sheet and parallel to the hem will guide bed making and insure a firm tuck-in. The innovation, known as "Anchor Line," is expected to speed up bed-making and increase comfort as the proper length of cloth is always tucked under and the sheet does not creep up.

Carolina Yarn Association will hold its fall meeting and golf tournament at Carolina Inn, Pinehurst, N. C., Oct. 29-30.

Deeds conveying titles to 150 homes were recently delivered in Alamance County, N. C., to employees of Burlington Mills Co. About a year ago the mill sold houses to its employees giving bond covering the titles.

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Cotton Mill News

Eastern Mfg. Co., Selma, Ala., has announced plans for a modernization program and an addition to the Lizzie unit of the plant. Contracts are said to have been placed for 10,000 new long-draft spindles, new picking and drawing machinery. Village also will be renovated.

Powdrell & Alexander, Inc., Danielson, Conn., has acquired the spinning machinery in the Wauregan-Quinnebaug mills and has leased space for a ten-year period. It is planned to manufacture yarn for its own requirements. This is the third unit operated in Danielson by Powdrell & Alexander.

Swift Mfg. Co., Columbus, Ga., has completed construction of a three-story addition, 72 x 121 ft., and will use the larger part of the unit for expansion in finishing division, occupying the two upper stories for this purpose. The first floor will be used for a machine shop. The structure represents an investment of about $50,000, with equipment.

Rushton Cotton Mills, Griffin, Ga., is replacing 108 looms with Model-X Draper machines.

Gainesville (Ga.) Cotton Mills have installed 146 42-inch looms, replacing a like number of 32-inch looms.

Callaway Mills, LaGrange, Ga., are constructing an addition to the Hillside plant, which will be used to house the slasher department. The Newman Construction Co. has charge of the work. The addition will measure 75 x 132 ft.

Pacolet Mfg. Co., New Holland, Ga., has had two of its Barber Colman spoolers and warpers equipped with the new vacuum cleaning system by the Textile Shop of Spartanburg, S. C.

Roswell (Ga.) Mills, Inc., has work well under way on an addition to the No. 2 mill. This addition will be used for a new weaving department, and is scheduled to be finished this fall.

Martha Mills, Silvertown, Ga., textile division of the B. F. Goodrich Rubber Co., have in process of construction a three-story addition to Plant B, which will be known as Plant C, and will be used to house preparatory and finishing machinery to balance Units A and B spindles which were installed in order to conform to the textile code of 1933. The company is building 75 operatives houses.

Washington Mfg. Co., Tennille, Ga., is having its slubbers and intermediates overhauled by Dixie Spindle & Flyer Co., Charlotte, N. C.

West Point (Ga.) Mfg. Co., has begun erection of one-story addition to branch mill at Shawmut, Ala., for which general contract recently was let to the Batson-Cook Co., West Point, to be equipped as a testing laboratory and for other operating service. It will cost over $40,000, with equipment. R. Kennon Perry, Mortgage Guarantee Bldg., Atlanta, Ga., is architect.

Puritan Cordage Co., Louisville, Ky., is erecting a brick addition to give 3000 sq. ft. for manufacturing facilities and storage.

Borden Mfg. Co., Goldsboro, N. C., has installed 5,000 long draft spindles and other new equipment in order to step up the production.

Pee Dee Mfg. Co., Rockingham, N. C., is installing in Mill No. 1 the No Drip slasher exhaust system put out by Textile Shop, Spartanburg, S. C.

Clifton (S. C.) Mfg. Co. has completed installation of new spinning frames for long-draft warp and filling in No. 2 mill.

Darlington (S. C.) Mfg. Co. has installed 78 additional used looms.

Laurens (S. C.) Cotton Mills is having a vacuum lint and dust collector installed on its 180 spindle automatic spooler by Textile Shop, Spartanburg, S. C.

Startex Mills, Tucapau, S. C., have been engaged in the installation of new machinery, including looms, spinning frames, drawing frames and cards.

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Cotton Financial Notes

Dwight Mfg. Co., Alabama City, Ala., is reported considering a $900,000 addition.

Lowe Cotton Mills, Huntsville, Ala.—Goodyear Tire & Rubber Co., Akron, Ohio, is said to have negotiations under way for the purchase of this property, idle for about four years.

Lawton Mills, Plainfield, Conn., ceased operation Aug. 14 and the property has been placed on the market by its owner, General Cotton Co., of Fall River, Mass. Operations had been on a skeleton basis for some months.

Sibley-Enterprise Co., Inc., Augusta, Ga., has been organized to take over and consolidate the Sibley Mfg. Co., and Enterprise Mfg. Co., both operating local cotton mills.

Lawrenceville (Ga.) Cotton Mills, recently organized by R. B. Lowe and associates, have taken over local mill property, idle for about three years, and will resume production at once, giving employment to about 200 operatives.

Slater Co., Webster, Mass., is closing one of two weaving departments and is reported as preparing to close out its entire holdings in Webster.

Pepperell Mfg. Co. reports net profit for fiscal year ended June 30, 1936, of $1,121,000 compared with net loss of $438,063 for previous fiscal year.

Victor-Monaghan Mills reports net profit of $254,000 for fiscal year.

Robinson Yarn Mills, Inc., Dallas, N. C., recently organized, has taken over the local No. 3 plant of the United Spinners, Inc., and operations have been started. It is expected to have mill in full production at early date. Ralph L. Robinson, president, Parkdale Mills, Inc., Gastonia, N. C., heads the new company.

Florence Mills, Forest City, N. C., are arranging for a merger with the American Spinning Co., Greenville, S. C.

High Falls (N. C.) Mills, Inc., recently purchased by Arthur Ross, E. M. Kearns, John H. Presnell and H. C. Jones, has been renovated and improved for the manufacture of yarns.

National Cotton Mills, Inc., Lumberton, N. C.—Sale of mill of this company to the Pates Supply Co., Pembroke, N. C., on bid of $31,525, has been confirmed by the Superior Court. Sale includes mill buildings on tract of 188 acres of land and housing development of about 40 homes.

TEXTILE WORLD'S

Wool Digest

WE happened to be digging through some old files the other day and ran across the wool statistical reports which were issued periodically by the Bureau of the Census a few years ago. We had become so used to the snappy-looking reports of today that it was rather a shock. So we laid the old and the new side by side: wool consumption, wool machinery activity, and wool stocks.

The most noticeable change of course, as indicated above, is in appearance. There is as much difference between the two vintages as there is between the Model T Ford and today's V-8. But more than that, the *usefulness* to the industry and other interested groups has been increased tremendously by the transformation.

The Bureau of the Census deserves credit for this job in modernization of these statistical reports. So does the National Association of Wool Manufacturers, which has cooperated with the Bureau.—*Editor.*

Spring Pre-opening Prices Are Maintained

Although the spring, 1936, season in men's wear fabrics has opened at about 5% down from the recent past, it is 7½% above the basis of a year ago. These facts were reported in this department last month, based on pre-opening quotations. When prices were announced late in August, the preopening levels were maintained. This gave a distinct shock in quarters where low preopenings are taken for granted as always being balanced with advances at the formal start of the season. Such groups registered dismay when the season this time carried through into the open the privately named bases of several weeks back. Competition, plus some consideration of the Patman Act, is responsible. The result is likely to be helpful since raw wool remains firm and goods should appear to buyers as unqualified bargains.

The spring season promises other surprises which may be better or worse than that of the present price level. The foremost is the probable rise of staple rayon fabrics in the field of summer wear. The fiber is of course cheaper than wool and at the same time cooler. Despite the strength of that prospective competition, the initial business in regular lines of tropical worsteds is reported as already 30% ahead of similar business a year ago. Another source of surprise lies in the high vogue for fancies in distinction to staples. This is a condition which aids yardage sale over all, but makes the work of particular mills harder than otherwise.

It is too early to appraise the actual spring business since some houses have not yet shown their lines and the major influx of buyers is not expected before the middle of the month. Mills have apparently gone a long way to show that they are on rock bottom at the start of the season and buyers will find the market more sensitive to a rising than a falling trend.

Women's wear has been selling well for fall. Flannels for suits, skirts and bath robes have been selling well. Sports fabrics are active with dressy cloakings quiet. It is still too early to talk specifically on the spring season in the women's wear trade, although winter resort materials may be under way in another six weeks.

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Union Would Like A Closed Shop

Having had poor luck with its modest demands for a 20% wage increase and a 35-hour week throughout the woolen and worsted industry, the U.T.W. would now like to get one of the fair-sized mills on a closed-shop basis, and then use this as an example and lever to pep up the membership drive. As examples there are the abortive strike at Bell Co., Worcester, Mass., and the current squabble at the Hayward-Schuster units in East Douglas and Franklin, Mass. In both cases, there has been no question of wages and the management has not objected to workers joining the union, but the closed-shop demand has fallen on deaf ears.

However dear the closed shop may be to labor organizers, it isn't a particularly vital issue to the average worker. This was illustrated at the Bell Co. A small group of operatives walked out and demanded a closed shop. The mill is in the high-wage group, however, and it soon became evident that the vast majority of the operatives wanted to keep right on working. The management handled the situation diplomatically so that no feelings were hurt and full production was resumed. When work is steady and wages high, the union has a tough time keeping a strike going on a closed-shop issue alone.

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New Columbia Wool Course

University Extension, Columbia University of the City of New York announces the appointment of Werner von Bergen, chief chemist of Forstmann Woolen Co., Passaic, N. J., as a teacher of a new evening course in woolen and worsted manufacture. This course will be given for the first time this fall.

Blankets Advanced

Makers of blankets advanced prices about 5% in the middle of August. W. S. Libbey & Co. raised two lines of jacquard blankets by that percentage. American Woolen Co. advanced Gramercy 72x84 from $4.75 to $4.95. Whittenton Mfg. Co. raised its best line 10%; cheaper jacquards unchanged. Part-wool lines have been advanced 2½%.

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Men's Wear Spring Prices

Samuel Hird & Sons opened spring lines Aug. 25. Their No. 612 vigoreux, three-eighths quality, is at $1.50; a new 13-oz. cloth No. 4000, 64s quality is at $1.75. They also offer a 60-40, worsted-rayon 12 oz. cloth at $1.35.

American Woolen Co. has priced BB9080, a 12-oz. piece-dye, at $1.67½; BB9082, 14 oz., at $1.82½; W9270, wool and worsted twist, at $1.72½; W9277, cotton and wool twist, at 90c.

William H. Prendergast Mills priced fancy worsteds at $2.10 to $2.17½ base.

All-wool flannels for trouserings are on the market at 62½ to 97½c. Flannels for the bathrobe and skirt trades are priced around 92½c.

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Signs of Life in Raw Wool

After kicking along in pepless fashion since early June, the Boston wool market snapped out of it the last two weeks of August and the turnover was fair. Increased volume served as a tonic to prices and soft spots were wiped out. Indications are that prices will hold at about the present level for the next month or two, with considerably more chance for a rise than for a drop.

The new Australian season opened without support by Japan but purchases by Germany and Italy so offset this absence that prices rose 5 to 10% above the June levels. Prospect is for American demand to consume the domestic clip now on the market before the 1937 clip becomes available; this means dependance on foreign wools and makes their price levels of keener interest.

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Prices and Statistics

Key wool prices of Sept. 1 and a month ago, contrasted with those of the last two years:

	Sept. 1, 1936	Aug. 1, 1936	Sept. 3, 1935	Sept. 1, 1934
Fine and fine med. territory	$0.85	$0.84	$0.68½	$0.73½
Ohio 3/8s	.39	.38	.32½	.32½
Tops fine 64-66s	1.08	1.06	.94	.97½
average ⅜s	.97	.95	.79	.81½
high ⅜	.88	.88	.70	.76½
Noils, fine	.68	.68	.57	.52½
¼	.55	.53	.43½	.41½
2-40s 60s wstd. yarn	1.52½	1.52½	1.42½	1.42½
8020 serge	1.82½	1.82½	Not Quoted	Not Quoted

Current statistics on wool consumption and mill activity follow, activity percentage based on single 40-hour shift, 5 days per week. June is a 4-week, July a 5-week period.

	June	July
Wool consumed, clean equiv.		
Apparel, wool, lbs.	20,076,000	24,695,000
Carpet wool, lbs.	7,228,000	9,265,000
Machinery activity		
Looms (50" wide)	93.2%	86.9%
Carpet looms	60.6%	58.9%
Combs	116.0%	115.8%
Worsted spindles	71.5%	73.6%
Woolen spindles	111.5%	115.6%

Tops and Rags Move Oppositely

Prices on wool tops moved in a narrow range through the month of August starting with $1.04 on July 31 and ending with $1.03½ on Sept. 4, prices being for New York spots. Price on Sept. 11 was $1.04. Trading was quiet early in the month and accellerated toward the close.

Trading in wool rags slowed up as the month progressed and their prices, before markedly strong, became barely steady. It was said that woolen mill shutdowns due to sporadic labor difficulty had a definite effect in slowing the call for rags and reworks. Rag dealers reported prices steadier before Labor Day. The recession was due more to disappointment following the upward price surge in July than to any inherent factors of weakness.

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Unfilled Orders Tell a Story

Unfilled orders for wool goods (excluding automobile cloths) were estimated at 32,000,000 yd. at the end of August a drop of about 6,000,000 yd. since the end of June. The loss is wholly in men's wear, such goods swinging from 27,000,000 yd. down to 20,000,000 yd. Women's wear show a slight gain with the most recent figure 12,000,000 yd. against 11,000,000 yd. Unfilled orders for automobile cloths are estimated at 2,000,000 yd. most of which was ordered in July.

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Strength in Carpets

Wool carpets and rugs have been advanced in price about 7% effective Sept. 1 by several large manufacturers. It is believed that the higher basis will be adopted by the market as a whole.

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Wool Industry Briefs

Makers of camp blankets got together on Aug. 27 and agreed to the same labeling rules as have obtained for some months in the bed blanket field. There has been some confusion because of this splitting up of the blanket industry on a basis not wholly logical to the consumer. Now inequalities of labeling competition have been wiped out effective Sept. 14. The wool content of most high grade bed blankets is virgin wool, while that of most camp blankets is reworked wool—so comparisons based on labels may still be misleading.

Garbardine is going to be a popular fabric in the world of ski pants this winter. Though not a great yardage is likely for this use, it will lend prestige to the fabric for general winter sports wear.

Goodall Co. is said to be laying plans for a new clothing plant in South Knoxville, Tenn., to carry on Palm Beach clothing manufacture when lease on present premises expires two years from now. Goodall's garment prices for the spring and summer season of 1937 are expected to be out before the end of September.

Farr Alpaca Co. has opened its top division offering rayon, wool, worsted, mohair and alpaca tops to the trade. Royal Mfg. Co., with offices in Boston, New York, Philadelphia, Chicago, Rahway, N. J. and Charlotte, N. C., has been appointed sole selling agent for these tops.

American Woolen Co. has opened an office at 150 Causeway St., Boston, in charge of W. M. Phillips, to sell yarns to the hosiery and knitting trades.

Guinea pig fur looms as a textile fiber for purposes similar to rabbit hair. Breeders are said to be trying to raise a larger type of guinea for this purpose.

Pendleton Woolen Mills, Portland, Ore., has published an instructive booklet entitled "The Romantic Story of Man and Wool" which it is distributing to consumers. The booklet gives numerous interesting associations of wool with historical events and analyses the advantages of the fiber to the clothing-wearer. The booklet lends prestige to the fiber.

A freight car load of sacked wool on an Autocar truck lately bought by the Philadelphia Wood Scouring & Carbonizing Co. It is 33 ft. over all and is said to be the largest of its kind.

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Wool Mill News

Ludlow (Mass.) **Mfg. Associates** have work nearing completion on initial units of new plant at Edge Moor, Del., on 54-acre tract. The main mill will approximate 320,000 sq. ft. of floor space and is scheduled to be ready for service by the close of September. The company has installed Diesel engine units for power service. The new mill will give employment to more than 700 persons. Barclay White Co., Philadelphia, Pa., is general contractor.

Lebanon (N. H.) Woolen Mills Corp., has taken over local mill property of the American Woolen Co., at one time known as the Riverside mill, and will improve and occupy at once for expansion. Facilities will be provided for about 300 operatives.

Hardwick Woolen Mills, Cleveland, Tenn., have installed a "streamlined" cutting machine.

Sumter (S. C.) Textile Mills has awarded Textile Shop, Spartanburg, S. C., contract for recovering two No. 7 dry cans with copper.

Harding Carpets, Ltd., Branford, Ont., are installing a battery of looms and auxiliary equipment for large expansion in output, to be given over to production of jacquard rugs as manufactured by Artloom Corp., Philadelphia, Pa., with which agreement has been made to produce such rugs in Canada. Equipment being installed was secured through the Artloom Corp.

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Wool Financial Notes

Bigelow-Sanford Carpet Co., Thompsonville, Conn., report net profit of $497,795 after all charges except Federal surtax, for the first six months of the year. This compares with a net loss of $320,582 for the corresponding period of 1935. Sales gained 23%.

Eastland Woolen Mills, Corinna, Me., formerly known as the Katahdin Woolen Mills, have resumed operations under new management, headed by E. K. Prior, formerly connected with the Atlanta (Ga.) Woolen Mills.

Dissel Mfg. Co., Everett, Mass., has been organized with capital of 1000 shares of stock, no par value, to operate a local woolen mill. Leon F. Sargent, 14 Cabot Street, Winchester, Mass., is president and treasurer.

Wallace Woolen Mills, Inc., 1299 West Ann Arbor Trail, Plymouth, Mich., have been organized with capital of $200,000, to operate a local mill. New company will be affiliated with the Burwell Corp., Plymouth, which will be actively interested in operations.

La France Industries, Inc. Manufacturers Trust Co. and Hayden, Stone & Co., claiming to own a majority stock interest, ask for dismissal of the 77B reorganization plea filed on July 24.

Shelton Looms have leased the Worcester Textile Co. plant at Valley Falls, R. I., for two years. Herbert Gregson will operate it on mohair and worsted yarns.

Cherry Brook Worsted Co., Woonsocket, R. I., has terminated its receivership following court approval of a 50% settlement.

Edward Mayer, San Angelo, Tex., is at head of project to construct and operate a local wool scouring mill. Tract of land has been secured and erection will begin soon. It will cost about $175,000, with equipment.

Copp Woolen Mills Ltd., a new concern, has taken over the woolen mill of F. H. Copp at Pt. Elgin, N. B.

TEXTILE WORLD'S

Rayon & Silk Digest

THE merry-go-round price situation which developed recently in rayon yarn due to different, and changing, policies on quality discounts, was just the sort of mess which might reasonably have been expected to paralyze the market. With one part of the industry selling yarns 5% below the other part, it would have been most logical for buyers to withdraw into their shells until the producers had fought it out and settled it. Obviously such a situation is not a tenable one.

Despite all this, however, sales went merrily on, and August volume set a new record. Stocks in producers' hands continued to shrink, and mill consumers found difficulty in getting their October orders accepted.

This is dramatic evidence, not only of the strong tone of the current market, but of the remarkable position which synthetic fibers have achieved as textile raw materials. It is fitting that we should record it in this particular issue which marks the 25th anniversary of the production of synthetic yarns in this country.—*Editor.*

7500 *Stores Ready For 3d Silk Parade*

Plans for the third annual Silk Parade which will be nationally celebrated by 7500 retail stores, Sept. 21 to 26, are rapidly approaching completion, it was announced early this month by the International Silk Guild. The event will carry silk's merchandising message to some 6,000,000 families, representing approximately 10,000,000 persons, through store-wide promotions and other events. Last month the Guild mailed to stores a small display poster, following this with the official poster which, as usual, symbolizes silk's distinguished history as a quality textile.

Other material sent to stores includes the annual market survey, and a multiplicity of data offering ideas and helps on how to plan displays, fashion shows, advertising, publicity or other tie-ups with the parade. The Guild announced that stores were more eager than ever to cooperate this year, having found the event effective in building profitable volume in the previous two years. One interesting feature in the 1936 event is the increased cooperation of the pattern companies; these firms are distributing posters featuring the Parade to stores to be displayed on pattern counters.

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Rayon Price Status Slowly Clarifying

As the outcome to considerable seesawing in prices which was precipitated by the announcement Aug. 3 that DuPont Rayon Co. would discontinue discounts Sept. 30, the end of August found the rayon market gradually adjusting to its new price situation. Various other companies—with the important exception of the Viscose Co. — duplicated DuPont's action and the consuming branches were beginning to make plans in conformity with the price rise which this represented when the Celanese Corp. announced a flat 5% discount to all customers.

The Celanese action brought acetate prices back to where they were before DuPont cancelled discounts. Following Celanese lead the American Enka Corp. on Aug. 24 announced a flat 5% discount to all, excepting the knitting trade, and there were strong indications that most firms would emulate that action. Up to the moment of going to press, however, the Viscose Co. had not changed its original position which was that prices would remain as is, pending study of the legal aspects of the Robinson-Patman Law, on which DuPont based its original cancellation of discounts. Thus the Viscose Co. prices to small buyers were above prevailing levels.

One of those to follow DuPont's lead in cancelling discounts was Industrial Rayon Corp., which firm likewise raised prices of knitted rayon fabric proportionately. The advance in tubular fabrics was duplicated by Tubize Chatillon Corp., and was generally welcomed as further proof that the long-weakened market tone on knitted fabrics now was being definitely strengthened.

Meanwhile demand held very strong in all branches, and producers' stocks were considerably below their low figure of a month previous.

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Industrial Completes New Process Plans

Reports that the Industrial Rayon Corp. had completed preliminary plans for erection of a new 10,000,000 lb. plant, to cost about $7,500,000 were confirmed this month by Hiram S. Rivitz, president of the company. This plant will employ the new continuous process of rayon manufacture which is owned by Industrial, as announced by Mr. Rivitz in the company's last annual report. The location of the plant has not been disclosed. It was also made known that a subsidiary company to manufacture the equipment required for the new process was being organized; this company will be called the Rayon Machinery Corp. and is capitalized at 10,000 shares of $100 par. The machinery firm will supply Industrial with equipment and possibly sell like equipment later to other rayon producing companies. Mr. Rivitz is president of the subsidiary and George P. D. Torrence, formerly president of the Link Belt Co., is vice-president and general manager.

The company further revealed that it is developing a machine for the manufacture of staple fiber; this machine, it is stated, will be similar in general lines to the company's new filament rayon machine.

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Current Rayon Data

Key rayon prices and statistics follow:

Prices	Sept. 1, 1936	Aug. 1, 1936	Sept. 3, 1935	Sept. 1, 1934
Viscose process				
75 denier (18-30 fils.)	$0.90	$0.90	$0.87	$0.90
100 denier (40 fils.)..	.79	.79	.76	.75
150 denier (40 fils.)..	.60	.60	.57	.55
Acetate process				
150 denier.....	.60	.60	.60	.70
Cupra. process				
150 denier (112 fils.).	.65	.65	.62	.70
Rayon Staple				
1½, 3 & 5½ denier.....	.28	.28	Not Quoted	Not Quoted

	Indices of Deliveries*	
	Year 1936	Year 1935
Statistics†		
Month		
August.....	633	550
July.....	614	433
June.....	498	381

* Rayon Organon.
† Exclusive of Acetate. Daily average 1923-25=100

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Current Silk Data

Key silk prices and statistics follow:

Prices	Sept. 1, 1936	Aug. 3, 1936	Sept. 3, 1935	Sept. 1, 1934
Crack XX 13/15 white 78%.....	$1.66	$1.72	$1.87	$1.11
Tram, 5thd Japan 85¼	2.34	2.41	2.67½	2.05
Tram Crack XX 5th 78¼.....	2.25	2.31	2.47½	1.80
60s-2, spun silk.....	2.95	2.95	2.75	2.95

Statistics	Imports	Approx. Deliveries	Stocks at Warehouses
June, 1936.....	26,780	31,437	35,409
July, 1936.....	31,388	36,658	30,139
August, 1936.....	41,702	42,016	29,825

Silk-Rayon Profits? F. T. C. Can't Find 'Em!

Financial results of operations by the silk and rayon branch of the textile industry were far from satisfactory during the first half of 1935, it is indicated in a report made public last month by the Federal Trade Commission. The report, based on data supplied by 304 silk and rayon companies shows that only two groups were operating at a profit; these groups were (1) companies throwing own silk and rayon, reporting 2.85% return on textile investment against a previous high of 2.54% for the first half of 1933; and (2) companies throwing silk and rayon on commission, in which branch 45 reported 0.46% return, against a substantial loss reported by 52 companies in the last half of 1934.

Companies throwing and weaving their own silk and rayon, of which 37 supplied data, reported a 2.97% loss on a textile investment of $53,545,963; this compares with 27 companies reporting losses from 0.37% to 2.82% in previous periods covered by the Commission's survey. Companies throwing and weaving silk and rayon on commission reported a loss of 3.02%, while companies weaving their own silk and rayon lost 0.28% on their textile investment.

The dyeing and finishing companies, the Commission states, "have consistently made the most unfavorable showing of any of the silk and rayon groups." This branch reported a loss of 4.63% for the period of the current survey, against losses of 6.1% and 3.8% in 1933 and 1934 respectively.

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Rayon's New Record

August shipments of non-acetate rayon yarn by domestic producers reached a new all-time high, it was announced this month in the *Rayon Organon*. The index rose to 633, volume again exceeded production and the *Organon* stated, stocks in producers hands fell to "the ridiculously low figure of 0.4 month's supply" based on average monthly shipments during the last 12 months.

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Raw Silk Up 3½c

Continued strength marked the raw silk market through most of August, with prices easing off at the end of the month. While the middle weeks saw some fluctuation, this instability was brief, and prices rose from $1.72 on Aug. 3 to $1.75¼ on Aug. 24, as listed at closing by the Commodity Exchange, New York, for crack double extra 13/15 78% whjte.

•

Rayon Fabric Sales May Set Record

August indications pointed toward a movement of rayon cloth to consumer outlets during fall which would exceed all records of past years, it was announced last month by the National Rayon Weavers Association, Inc. The statement accompanied the Association's monthly index of deliveries of rayon broad woven cloth, and pointed out that the July 1936 figures were above June, reflecting a seasonal increase of activity in weaving operations, particularly in dress goods and novelties. "This has been developing during the past 60 days," the Association commented, adding that "there are further indications this expansion will continue during the next six months"; this would mean that the usual seasonal recession in late fall would be less pronounced than usual.

Figures follow:

(1934-100)	May 1936	June 1936
Taffetas, Twills, Linings and Other Staples	211	250
Dress Goods, Novelties, and Other Fancies	73	99
Total	121	151

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Courtaulds Strike Ends

Settlement of a three weeks' strike of 1,700 workers at the Cornwall, Ont. rayon plant of Courtaulds (Canada) Ltd., was made known Sept. 4, when the plant resumed normal operation. Representatives of workers and the company reached an "amicable settlement," details of which were not revealed.

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Rayon-Silk Mill News

Leiss & Sussman Velvet Co., Willimantic, Conn., will begin operations this fall with looms designed by Alfred Leiss, one of the partners. He has been in the velvet business for 24 years of which the last 14 have been with Rossie Velvet Co. Mr. Sussman, president of the company has been active in local business for 29 years.

Tubize Chatillon Corp., New York, N. Y., has awarded contract for structural steel framing for new additions to mill at Rome, Ga., to the Virginia Bridge Co., Roanoke, Va., totalling about 700 tons. Expansion is estimated to cost over $2,000,000, as recently noted in these columns. Robert & Co., Atlanta, Ga., are architects and engineers.

Century Ribbon Mills, Inc., New York, N. Y., have work under way on one-story mill at Radford, Va., 50 x 200 ft., with wing extension, 50 x 50 ft., and will have unit ready for service in near future. It will cost over $50,000, with equipment.

Viscose Co., New York, N. Y., is awarding contracts for erection of one and multi-story mill at Nitro, W. Va., including award to Concrete Steel Co., 2 Park Avenue, New York, for 360 tons of reinforcing steel. Plant will be used for rayon yarn production and is reported to cost close to $300,000, with equipment.

Northampton Textile Co., Mount Holly, N. J., has work nearing completion on one-story addition to mill on Lippincott Lane, 42 x 60 ft., and will install 12 new looms and auxiliary equipment. Company has also leased a local three-story building on Church Street, formerly used by the Disdon-Alcott Turbine Water Wheel Co., and will remodel and occupy for new branch mill.

Pinehurst Silk Mills, Inc., Hemp, N. C., is constructing an addition which will be used for a throwing department, measuring 32,000 sq. ft.

Roanoke Mills, plant No. 1, Roanoke Rapids, N. C., has had the machinery overhauled. The Guillet overhauling system was used, with the Dixie Flyer & Spindle Co. of Charlotte, N. C., in charge of the work.

Dutchess Fabrics Corp., Statesville, N. C., has constructed an addition measuring 50 x 80 ft., which adds one-third more floor space to the mill.

Mifflinburg (Pa.) Silk Mills have resumed operations on a curtailed basis following shutdown for over a year. New equipment has recently been installed.

Emporia Textile Mills, No. Emporia, Va., have been re-organized and orders have been placed for new equipment, including C. & K. automatic box looms and dyeing machinery from Gaston County Dyeing Mchry. Co. Pepperell Mfg. Co., New York, will handle the sales. Capital is $100,000.00. New officers are: C. H. Gingher, recently with Burlington Mills, president-secretary; R. W. Jordan, vice-president, and R. W. Little, treasurer.

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Rayon-Silk Financial News

Joseph P. Hamil, Inc., Clifton, N. J., is considering early rebuilding of portion of local silk mill on Valley Road, recently destroyed by fire. Loss estimated close to $50.000, with equipment.

Elmira (N.Y.) Weaving Corp., has been organized by Paterson, N. J., interests, represented by Cole & Morrill, 45 Church Street, Paterson, attorneys, with capital of 500 shares of stock, no par value, to operate a local mill.

Duplan Silk Corp., New York, reports net profit for the year ended May 31, 1936, of $417.348. For the preceding fiscal year net profit was $414,816.

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TEXTILE WORLD'S

Knit Goods Digest

OF the many significant facts brought out by the hosiery wage survey, just completed by Dr. George W. Taylor and Lillian P. Goodman, of Wharton School, the most significant in our opinion is that emphasized in the concluding paragraph of the report.

In terms of hourly earnings received, it is stated, hosiery workers have substantially benefitted from the wage policies of the industry effective from July 1933 to June 1935. "In most occupations, and in most districts," it is stated, "average earnings in 1935 were higher than in 1929; in numerous cases they were so much higher as to provide greater earnings for 40 hours of work in 1935 as compared with 48 hours or more in 1929. Moreover, the price of labor had been made more nearly uniform throughout each branch of the industry in 1935, although the conditions of labor and results of the labor expended may or may not have been equalized to the same extent."

This is only one feature of the report, however. Throughout, it is of the impartial and scholarly nature we have come to expect in anything bearing Dr. Taylor's signature—and a further important contribution to the "record" in this branch of textiles.—*Editor.*

Hosiery Agreement Changes Unlikely

A belief, which grew gradually stronger through August, that the 1936 national agreement between the Full-Fashioned Hosiery Manufacturers of America, Inc., and the American Federation of Hosiery Workers would be renewed for 1937 without material changes, was tacitly confirmed Aug. 27. On that day, George Lang, of Co-Ed Knitting Mills and president of the manufacturers' organization announced that both sides had agreed to extend the present contract until the new agreement is ready for signature.

Mr. Lang would not discuss the probable terms of the new contract, but the decision to continue the present agreement, temporarily was interpreted as indicating that there would be few, if any important changes. Conferences between representatives of manufacturers and workers were held frequently at the Bellevue-Stratford Hotel, Philadelphia, during the month. It was reported that some manufacturers strongly favored a wage reduction to meet Southern competition, and that this had met with equal strong resistance from the union.

Mr. Lang took an optimistic view of the prospects for reaching an understanding. He stated that "everything points to an equitable settlement of the points at issue, which are minor adjustments, and to a renewal of the present agreement substantially in its present form."

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Gathering Hosiery Data

The gathering of statistical and other data which represents the first phase of the hosiery industry survey being conducted by the National Association of Hosiery Manufacturers, was rapidly being completed this month. It is expected that the material will be ready when Earl Constantine, managing director of the association, returns from Europe in October. The survey, authorized at the annual meeting last spring, was started several months ago under guidance of a special committee. It is understood that soon after Mr. Constantine's return the study will enter its second phase, namely the correlation and interpretation of the material at hand. The aim of the study is to develop ways of putting the industry on a more profitable basis.

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1935 *Wages High, Hosiery Study Shows*

Wages in the seamless branch of the hosiery industry in 1935 were above the 1929 level while full-fashioned wages in 1935 were just a fraction below the 1929 peak, according to a study of "Recent Changes in Hourly Earnings of Hosiery Employees," just completed by Dr. George W. Taylor and Lillian P. Goodman, of the Industrial Research Department, Wharton School of Finance and Commerce, University of Pennsylvania. The report shows that in the full-fashioned branch average earnings for four key years between 1929 and 1935 were as follows: 1929—$0.670; 1933—$0.380; 1934—$0.624; 1935—$0.665. These figures represent earnings for the following totals of workers, respectively: 28,991; 52,009; 55,122; and 50,896.

In the seamless branch earnings for the same four years, respectively, were: $0.308; $0.188; $0.383; $0.388; this represents wages paid to the following totals of workers respectively, 21,280; 41,294; 37,703; and 31,288.

Another highlight of the report is the picture it gives of wage trends in Northern mills as contrasted with those in Southern mills. Certain of the data indicated a greater increase in Southern than in Northern wage rates between 1929 and 1935. While observing that the narrowing of differentials between South and North promises to continue, Dr. Taylor adds a cautioning word. He points out that, because of problems peculiar to the South "an extremely wide variation can continue for many years before 'natural economic forces' bring about equality (between North and South) in the price of labor as measured by hourly earnings."

The study is notably complete; it covers hourly earnings by districts and occupations as well as industry divisions, and it is supplemented by 25 tables. In his foreword Dr. Taylor warmly praises the work done by his associate, Miss Goodman. "Completion of the study," he writes, "is due primarily to her sustained effort."

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N. Y. Outerwear Exodus May Affect Market

A widespread exodus of outerwear mills from the Metropolitan New York area to semi-rural communities when the current season ends in November or December, is predicted by Harold R. Lhowe, Executive Director of the National Knitted Outerwear Association in a recent issue of the association's house organ, *The Knitted Outerwear Times.* Mr. Lhowe writes that the exodus will be of "major significance" to the industry because it will result in establishing in semi-rural communities "low labor-cost units producing merchandise made in the New York manner." He adds that "urban production throughout the country may find in this development very difficult competition." He concludes with the warning that "adjustment to this changing condition should not be delayed."

The trend away from New York, which has been increasing for several years, is believed to have been greatly stimulated by the August strike of outerwear knitters in that area.

•

Hosiery Shipments Continue to Rise

Hosiery shipments in July, 1936, were 474,833 doz. prs. or 5.4% above the month previous and 36.7% above July, 1935, according to this month's announcement by the National Association of Hosiery Manufacturers. Shipments in July totaled 9,321,587 doz. prs. The association comments that "the usual June-July recession for certain types either was entirely absent this year or was much less than might have been expected on the basis of previous experience." For the first seven months of 1936 total shipments of all types of hosiery were 9.3% greater than for the comparable period a year ago.

The following table shows shipments by major branches by dozens of pairs:

Type of Hosiery	First Seven Months		Per Cent Increase 1936 Over 1935
	1936	1935	
Total, all types	65,292,752	59,722,536	9.3
Women's full-fashioned	18,819,262	17,922,134	5.0
Women's seamless, excl. wool	6,857,429	5,837,451	17.5
Men's half-hose, excl. wool	18,665,701	17,643,065	5.8
Children's and infants' hosiery*	3,251,175	2,978,422	9.2
Anklets	12,519,814	10,771,622	16.2
Cotton bundle goods	2,118,098	1,894,748	11.8
Ribbed goods	1,874,652	1,544,535	21.4
Woolen goods†	1,186,623	1,130,561	5.0

* Boys' and infants' socks, children's ½ flat and ¼, boys' golf hose.

† Women's and men's seamless wool, men's golf hose, woolen bundle goods.

Total production of all types of hosiery during July, 1936, amounted to 9,892,993

doz. prs. As is usual in July, production of hosiery exceeded shipments for most types but such stock increases as took place seem justified at this time, in view of the impending fall season, and inventories appear to be generally in a sound position. Total stocks of all types of hosiery on hand at the end of July, 1936, amounted to 20,370,139 doz. prs., as against 19,937,552 doz. prs. on hand at the end of July, 1935.

•

Good Underwear Call

Early interest in Spring, 1937, lines by buyers was a feature of the month in the underwear market, adding strength to a generally satisfactory situation. Though August is normally a slow month, mill executives reported many inquiries from distributing channels with regard to the spring season and also a fair amount of reorder business on current lines. Prices were holding to the advances of last month with prospects pointing to continued firmness through September. The upward trend of both raw cotton and knitted rayon fabrics had a stimulating effect and was regarded as contributing to the confidence shown by buyers.

•

Outerwear Campaign Plans

A 14-page handbook containing sketches of the newest knitted outerwear styles will be distributed this month to 16,000 retail merchants as part of the national promotion campaign being conducted by the Knitwear Institute. Explaining the Institute's plans, Sidney S. Korzenik, managing secretary, stated that a sales manual also is being prepared and will be sent out to stores for distribution among retail clerks. This manual will cover all the salient points involved in making and selling knitwear from the customer point of view.

•

Industry Briefs

Hosiery Mills Raise Wages—Two Southern manufacturers of hosiery raised wages during the month. The Elizabeth City (N. C.) Hosiery Co. announced Aug. 25 that NRA code wages and hours have been reestablished in that mill. The Vance Hosiery Mills, Kernersville, N. C., announce a 15% wage rise to seaming, pairing and boarding departments, to bring these into line with other departments.

Outerwear Strike Situation — Strike of outerwear knitters in Metropolitan New York which began Aug. 11, was still in the negotiation stage at the end of the month. Claims as to the strike's effectiveness varied greatly: Harold R. Lhowe, executive director of the Eastern District Knitted Outerwear Manufacturers' Association, who also heads the national body, asserted that less than 10% of the industry's output was involved, and only a few mills affected. Union leaders, however, claimed 10,000 workers out in a large number of mills.

Rayon Underwear Price Outlook— Recent advances in knitted rayon underwear fabric prices raised speculation in the market as to whether this presaged a general advance on rayon underwear quotations. Mill men tended to the belief that the rise would strengthen staple merchandise prices for spring 1937.

New Knitwear Fashions photographs on page 63 of our last issue were made available through courtesy of Associated Wool Industries, Inc.

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Knitting Mill News

Pure Silk Hosiery Mills, Inc., Panama City, Fla., recently organized, have acquired local property and will install equipment at once for a new knitting mill. New company is headed by Harry J. Gross and Harry Lees, both of Panama City.

Rodgers Hosiery Co. has completed its branch plant at Athens, Ga., and 50 full-fashioned machines are being installed. The enterprise represents a $200,000 investment which will be doubled if present plans are carried out.

McDonough (Ga.) Hosiery Mills have made preparations to erect a new building.

Rubens & Marble, Inc., Chicago, Ill., have acquired industrial building at Fullerton and Racine Avenues, two-story, 125 x 263 ft., totaling about 65,000 sq. ft. floor space, now occupied by the Northern Lithographic Co., and Northern Bank Note Co., which will continue to occupy for a number of months.

National Silk Hosiery Mills, Inc., Indianapolis, Ind., are being enlarged, according to G. V. Kobin, president, and an additional one-story daylight building, to provide 5,000 sq. ft. more space, will be constructed adjoining the plant.

Warner Knitting Co., Clayton, N. Y., which recently installed new equipment, now has 68 sewing machines and 19 knitting machines for daily output of 450 dozen bathing suits and sweaters.

Foster Hosiery Mills, Burlington, N. C., has installed four additional full-fashioned hosiery machines and auxiliary equipment

Penn-Carol Hosiery Mills, Concord, N. C., recently organized, have taken over machinery and equipment from the mill of Thomas W. Buck Hosiery Co., Philadelphia, Pa., which is being transferred to the former Concord plant of the Hoover Hosiery Co., West Depot Street, leased by the new organization.

Mock, Judson, Voehringer Co., Greensboro, N. C., is completing the two-story brick-and-steel addition which has been under construction for some time. It is 107 x 128 ft. and will add some 30,000 sq. ft. of floor space. Production will be increased by about 25%, and 300 more persons will be employed. Machinery installation is scheduled to begin as soon as the building is finished.

Fremont Hosiery Co., Thomasville, N. C., is completing a new building.

Reading Maid Co., manufacturer of hosiery, has installed eight new machines at its Weissport, Pa., plant. About 20 additional workers have been hired.

Boyertown Knitting Co., Bristol, Va., lately chartered under state laws, has taken over the local mill and equipment of the **Tenneva Hosiery Mills,** Goodson Street, closed a few months ago, and will begin production at once.

Pannill Knitting Co., Martinsville, Va., has expansion under way at local mill, including installation of a quantity of machinery recently secured from the Everett-Norfolk Co., Lebanon, N. H. Capacity will be increased about 35% and working force enlarged.

National Hosiery Mills, Ltd., Hamilton, Ont., have let general contract to the Stewart Construction Co., Ltd., Sherbrooke, Que., for one-story mill at Richmond, Que. Cost estimated close to $40,000 with equipment.

Circle-Bar Knitting Co., Ltd., Kincardine, Ont., has acquired plant and business of the L. O. Hudson Co., Ltd., St. Catherines, Ont., and will consolidate with its organization.

Knitting Financial

Pure Silk Hosiery Mills, Inc., Panama City, Fla., has been chartered with an authorized capitalization of 100 shares no par value. Principals are H. Lees and J. H. Gross.

New Haven Silk Hosiery Co., Inc., Fort Wayne, Ind., will be sold. The board of directors has been authorized to accept bids.

Bethlehem Knitting Mills, Inc., 165 Front Street, Chicopee, Mass., have been organized with capital of $50,000, to operate a local mill. Justin Cohen is president; and R. W. Proctor, 357 Newbury Street, Springfield, Mass., treasurer and representative.

Munsingwear, Inc., Minneapolis, reports net profit for first six months of $171,692, compared with $5,607 the previous year.

E-Z Mills, Inc., Hoosick Falls, N. Y., which recently abandoned is plant here, is now combined with the branch at Bennington, Vt.

Union Mills, Inc., St. Johnsville, N. Y., recently leased to Eugene Steffanasse and associates of Garfield, N. J., is now in operation producing knit goods.

Gotham Silk Hosiery Co. reports profits for the first six months of $150,999 against $92,774 for first half of 1935.

Julius Kayser & Co., New York, reports net profit of $645,842 for fiscal year ended June 30 against $408,085 for previous period.

Glen Raven Knitting Mills, Inc., was chartered Aug. 10, to manufacture and sell cloth and knitted fabrics under $20,000 authorized capital. The incorporators are Allen Gant and Roger Gant, of Glen Raven, N. C., and Russell Gant and Cecil Gant, both of Burlington, N. C.

Sterling Knitting Mills, Hickory, N. C., has been incorporated by S. F. Menzies and Donald F. Menzies.

Emory Hosiery Finishing plant has been moved from Durham, N. C., to Hickory, N. C., and is housed in a building recently vacated by the G. & H. Hosiery Co. It is engaged in finishing seconds manufactured by various Hickory hosiery mills.

Vance Hosiery Mill, Kernersville, N. C., has granted a 15% wage increase to seaming, pairing and boarding departments, bringing the scale increase to a level with other departments.

Spruce Pine, (N.C.) Holding Co. has been formed to erect a new hosiery mill in that city. The C. C. Robbins Knitting Mills, of High Point, N. C., will install the machinery and operate the plant.

Esquire Knitting Mills and **Gem Knitwear Co.,** have been established at Lindley and Camac Aves., Philadelphia, Pa., under the management of Jacob Rubin.

Gold Crest Full-Fashioned Knitting Mills have been organized in Philadelphia, Pa., with headquarters at 16th St., and Indiana Ave., by James C. West and Russell C. Clouden.

Roxborough Knitting Mills, Inc., Philadelphia, Pa., is arranging financing through sale of preferred and common stock to total about $231,450, proceeds to be used in part for general operations and working capital.

Security Hosiery Mills have been established at Amber and Westmoreland Sts., Philadelphia, Pa., under the management of M. A. Volz, 80 Heller Pkwy., Newark, N. J.

Berkshire Knitting Mills, Wyomissing, Pa., is experiencing an exceptionally busy season. About 100 machines of various kinds for finishing which had been stored away for some time have been put in operation with additional operators for each machine.

Knoxville (Tenn.) Knitting Mills Co., once comprising 611 knitting and 165 ribbing machines, is being liquidated, according to L. O. Wilson, general manager.

TEXTILE WORLD'S

Processing Digest

AS we write this, the silk and rayon finishing industry in the Paterson area is emerging from one of the most serious crises of its crisis-dotted history. Unfortunately, the settlements made can only be considered a temporary palliative. The deep-laid basis for the trouble requires most careful study, if anything resembling a permanent cure is to be realized.

This situation is not merely a Paterson problem. Its effect extends beyond the limits of that district and proves disturbing to the entire finishing industry. Consequently, it is of interest to finishers everywhere that a more healthy basis be reached in that area.

One possible solution would seem to be the appointment of a State Commission to study the crisis from all angles and to make recommendations. We know that such commissions do not always prove to be of much use. But, with the proper personnel and proper "follow-through," they *can* be helpful. We suggest one in this case.—*Editor.*

Dyers Organize

Formation of the Dyers' Textile Guild, Inc., by 29 dyeing plant owners in the Paterson, N. J., district, was made known last month. They will function both in an executive capacity for the industry and also in labor relations. It will act as a central billing, adjustment, collection and transportation agency, and also will serve as a medium through which the operators will negotiate with their organized workers, it is reported. Alfred Bohny, president of the Modern Central Dyeing Co., is president of the organization and Alexander Patterson is secretary.

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N. J. Exodus Threat By Finishers Wanes

The possibility of an exodus of leading finishing plants from the Paterson, N. J., area, which disturbed civic bodies there during August, appeared to be waning at the opening of the current month. The desire of finishers to move was ascribed largely to dissatisfaction with terms offered in current labor negotiations, but also to heavy taxes imposed in the county. Early in the month, it seemed likely that the district would lose three major firms—United Piece Dye Works, National Dyeing and Printing Co. and the Textile Dyeing and Printing Co.

However, arbitration moves were instituted by local authorities with the following results: on Aug. 26 it was announced that National Dyeing and Printing had signed a two-year contract with the union; on Aug. 29, Mayor Cavallo of Lodi, N. J., intimated after several conferences with United Piece Dye Works officials that it was likely this plant would remain at its present location; he also stated that Rochelle Park Velvet Works, a UPD subsidiary, had signed with the union for two years at the prevailing wage scale. The news about the Rochelle Park company signing meant that practically all but the parent UPD company had accepted the union agreement effective Sept. 1, Textile Dyeing and Printing having signed Sept. 9.

Earlier reports that United had leased 35,000 ft. of floor space at Chester, Pa., with a view to moving its business there was believed to have helped the arbitration efforts with that firm. Local authorities also were hopeful that some satisfactory settlement of the differences between labor and the Textile Dyeing & Printing Co. might be effected. Meanwhile various finishing firms have tax reduction appeals pending.

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Water-Softening Chemical

A new water-treating chemical for softening and neutralizing water has been announced recently by Creative Chemical Co., Pittsburgh, Pa. This compound, known as Zeolene Watertone, is a non-viscous liquid which is fed into the water. The compound is said to give a constant supply of zero hardness water of neutral reaction on the pH scale. The chemical is applied by means of a special feeder which can be attached to a flow line to a storage tank or filter, or to the water line for direct treatment of the water.

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Discusses Munsell Color System

At the Conference on Color, held July 24, at Massachusetts Institute of Technology, Dr. Walter M. Scott, service director, Gustavus J. Esselen, Inc., described the Munsell system of color specification. One of the most recent applications of the Munsell system was to identify new colors shown this summer in the salons of Paris dressmakers. The color specifications were then transmitted by cable to a department store in this country, so that reproductions of the colors could be placed on sale here within 48 hours of the original showing in Paris.

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Columbia Alkali Enters Liquid Chlorine Field

Announcement has been made recently that Columbia Alkali Corp., 30 Rockefeller Plaza, New York, has started commercial production of liquid chlorine and electrolytic caustic soda. A new plant, using standard-type electrolytic cells, has been completed at Barberton, Ohio, and shipments of liquid chlorine are being made in single and multiple tank cars and in 100- and 150-lb. cylinders.

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New Dyes

Calco Chemical Co., Inc., announces the following new products: Calconese Brown R, an acetate dye giving reddish brown shades of very good fastness to light, washing, and dry-cleaning; Calconese Blue MC, an acetate dye yielding shades of very good all-round fastness; and Calcoloid Golden Orange 4RD, a dispersed vat color.

General Dyestuff Corp. announces the following new products: Indanthren Navy Blue 3 G, a vat dye of excellent fastness to light and very good to excellent fastness to washing; and Indanthren Dark Brown, RT, a vat dye of very good fastness to light and washing.

E. I. duPont de Nemours & Co. announces the following new products; Neutral Brown 2RS, an acid dye producing bright, reddish brown shades on silk; Anthraquinone Blue SWF, an acid dye yielding bright, medium shades of blue on wool; Diagen Black MR (pat.), a stabilized azoic color recommended particularly for cotton printing; and Ponsol Flavone GCS and Ponsol Red BNS, two vat colors in grain form equal in strength and fastness properties to the corresponding double-paste brands.

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Chemists Make Merry

Problems of textile chemistry were temporarily forgotten Aug. 14-15 by the southeastern, south-central and Piedmont sections of the American Association of Textile Chemists and Colorists when these organizations held their third annual joint outing at the Signal Mountain Hotel, Chattanooga, Tenn. More than 150 attended the event at which all business was taboo. The official host was Walter E. Hadley, of the Standard-Coosa-Thatcher Co., chairman of the southcentral section. His associates were C. L. Eddy, of the Renfrow Bleachery, chairman of the Piedmont section, and C. A. Jones, of the Georgia School of Technology, chairman of the southeastern section.

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Waterproofing Process

Various advantages are claimed for a new process for waterproof-coating silk fabrics, which process is now being commercially promoted by the Standard Insulation Corp., of Rutherford, N. J., through newly opened sales headquarters in New York. L. G. Lange, president, announced that he developed the process through 18 years of work, and that the process is secret but not patented. He stated that its outstanding features when applied to Japanese silks are that it eliminates stickiness,

rancid odor and the danger of spontaneous combustion, to all of which, he stated, oiled silk is susceptible. He added that the process is suitable for various kinds of merchandise of which waterproofed fabric is a necessary part.

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Effect of Heat and Pressure on Cotton Fabrics

Results of an investigation to determine the effect of heat and pressure on cotton fabrics are reported in Technical Bulletin 517, of the U. S. Department of Agriculture. This work shows that at a pressure of 1.3 lb. scorching takes place in 2.4 sec. at a temperature of 254.5° C. and in 30 sec. at a temperature of 141.5° C.; at a pressure of 4 lb. scorching occurs in 2.4 sec. at 198° C. and in 30 sec. at 132° C. The investigation was carried out by K. Melvina Downey and Ruth E. Elmquist, of the Division of Textiles & Clothing, Bureau of Home Economics.

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Industry Briefs

Atlas Underwear Honored—The preshrinkage process for knitted woolen underwear, recently perfected by Atlas Underwear Co., Piqua, O., has been awarded the Textile Approval Seal of the American Institute of laundering, it is announced. Atlas will use the seal in a nation-wide promotion drive.

"Colorcable" Perfected—Transmission of accurate color reproductions by cable became an actuality last month when new Paris fashion colors were received in New York by cable. The test was made by Marshall Field & Co., and five Paris colors were transmitted by cable using the "Colorcable" machine recently invented by Howard Ketcham, color engineer. The machine includes 87 color disks giving it a range of 300,000 shades. Mr. Ketcham made the original transmission from Paris and Marshall Field representatives advised him that the colors were received satisfactorily. This method of color transmission greatly facilitates American dyeing of fabrics in newest Paris colors. Actually, the reproduced colors appeared on fabrics in American stores about 48 hours after the colors were received by cable.

Water Resist Interest Grows—Demand for fabrics that are water-repellent is growing rapidly, according to studies made by E. I. du Pont de Nemours & Co. This company finds a sharp rise in orders for their new water repellent "Aridex" and report increased interest by trade and consumer in fabrics treated with this element.

Exclusive use in Canada of the Neva-Wet process on straight cotton and rayon goods has been secured by Dominion Textile, Montreal Cottons and Canadian Cottons Co., by a joint arrangement. The process renders any kind of fabric "water-repellent" but not absolutely waterproof.

Printers' Spring Plans—Spring plans were discussed at a meeting last month between the larger printers and those who are members of the Textile Printers' Guild, it is reported. It is understood that the meeting discussed spring price prospects; remarking on the notable firmness in prices last spring, printers expressed confidence that this firmness would be duplicated in the coming season.

Jesse M. Schneider, formerly president of General Rayon & Silk Dyeing Corp., has entered business on his own account to handle sales production of various dye houses in Brooklyn, Long Island and Paterson. The trade is offered a complete service in dyeing rayons, cottons and mixtures. The firm, Jesse M. Schneider, Inc., has opened offices at 47 West 34th St., New York.

Carolinas-Virginia section of the Association of Textile Chemists and Colorists will meet in Charlotte, N. C., on Nov. 7. Approximately 250 are expected to attend.

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Processing Plant News

Pond Lily Co., New Haven, Conn., is erecting a new brick salt shed, one story, 32 x 20 ft.

Warren Textile & Print Works, West Warren, Mass., is starting operations on the upper floors of No. 1 Thorndike mill, utilizing 40,000 sq. ft. and employing 75 persons in printing and finishing silk fabrics. It will incorporate under Massachusetts laws.

Beaunit Weaving Mills, Inc., Cohoes, N. Y., has installed new machinery in the dyeing and finishing departments.

Granite Finishing Works' addition at Haw River, N. C., one of the units of the Cone interests of Greenboro, N. C., has been completed at a cost of $40,000. It is for warehouse service.

Stonecutter Mills Co., Spindale, N. C., has begun superstructure for two new additions to plant, including a two-story unit, to be equipped for finishing department and a one-story structure for dye house. Improvements will also be made in existing mill. Entire program will cost about $100,000 and is scheduled for completion late in the fall.

Smitherman Cotton Mill, Troy, N. C., has added a dyeing department.

Erie Dyeing & Processing Co., Cleveland, Ohio, has plans for new one-story addition, for which superstructure will begin at early date. It will cost close to $50,000, including equipment.

Cutter Mfg. Co., Rock Hill, S. C., has underway considerable modernization and maintenance work including enlargement of the finishing department for installation of a Sanforizing unit.

American Finishing Co., Memphis, Tenn., is installing a Tandem Super-Sanforizing Range made by Textile-Finishing Machinery Co., Providence, R. I.

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Processing Financial

Jewett City Textile Novelty Co., Griswold, Conn., has increased capital stock from $200,000 to $240,000.

Arkwright Corp., Fall River, Mass., is considering a plan that may bring the finishing plant at Clearwater, N. C., to Fall River, and all marquisette finishing work may be done in Fall River. Decision is in abeyance.

White Bros., Winchendon, Mass., are to add two of the latest Sanforizing units.

Cretona Print & Dye Works, Inc., Clifton, N. J.—John W. Griggs, trustee in bankruptcy for this company, offered the property at a public auction, Sept. 9 and 10, including mill buildings and real estate, machinery and equipment. RFC, with offer of $385,000 was the only bidder.

United Piece Dye Works, Lodi, N. J., have closed down their local mill for an indefinite period, releasing about 6,000 employees. Excessive cost of operations is given as the reason, including taxes, water and wages. Company recently made application to Borough Council for a reduction of $1,640,402 in the taxable assessment.

Cadgene Piece Dye Works, New Brunswick, N. J.—Mill of this company on Quentin Avenue, idle for some time, has been purchased by the Mengel Co., Louisville, Ky., and will be occupied for another line of production.

Palisades Piece Dye Works, North Bergen, N. J., has purchased the plant formerly occupied by Mayfair Piece Dye Works in West New York, N. J. It is understood that it will be operated as a branch plant.

Jersey Dyeing Corp., Paterson, N. J., recently organized with capital of $100,000, plans early operation of local mill for dyeing and finishing of silks and rayons. The incorporators include Nathan Mintz and Leon Behr, 26 Journal Square, Jersey City.

Monarch Dye Works has been organized in Paterson, N. J., and will operate a plant at 72 Second Ave.

Mutual Dye Works, Inc., Prospect Park, N. J., have been formed with capital of $100,000, to operate a local dye and finishing mill. New company is represented by Frederick E. M. Ballon, 1450 Broadway, New York, attorney.

Novelty Dye Works, Inc., Paterson, N. J., have been formed with capital of 1000 shares of stock, no par value, to operate a local dye and finishing mill. Company is represented by Emanuel Shavick, 140 Market Street, Paterson, attorney.

Paramount Print Works, Inc., Paterson, N. J., has taken over the plant formerly the Parisian Print Works.

Regent Print Works, Inc., Paterson, N. J., care of Emanuel Shavick, 140 Market Street, Paterson, attorney and representative, has been organized with capital of 1000 shares of stock, no par value, to operate a local dye and print mill. The incorporators include B. Moran and G. Clark.

Trojan Piece Dye Works, Inc., Paterson, N. J., have been formed with capital of 1000 shares of stock, no par value, to operate a local dye and finishing mill. New company is represented by Emanuel Shavick, 140 Market Street, Paterson, attorney.

Finco Dye & Print Works, Brooklyn, N. Y., has had its reorganization plan approved by the court under 77B. Plant will be moved to College Point, L. I.

Aetna Piece Dye Works, Inc., Long Island City, have been incorporated with capital of 500 shares of stock, no par value, to operate a local dye and finishing mill. New company is represented by Vito J. Guariglia, 26 Court Street, Brooklyn, N. Y., attorney.

International Textile Printing Corp., New York, N. Y., has been incorporated with capital of $20,000, to operate a textile print and dye works in vicinity of New York. New company is represented by Theodore Charnas, 535 Fifth Avenue, New York.

Southern Mercerizing Co., Tryon, N. C., is being renovated to accommodate a new Butterworth warp mercerizing range.

Imperial Printing & Finishing Co., Cranston, R. I., has closed its mill for an indefinite period owing to labor difficulties.

Hand Craft Textile Printing Co. recently incorporated under Rhode Island laws, has leased a part of the White Rock Mill, Westerly, and will employ 30 persons at the start. Joseph Adams, Norwich, Conn., is president, and Raymond E. Allyn, vice-president.

Richards Textile Engraving Co., Norfolk, Va., has been organized by William H. Richards, Norfolk, and associates, to operate a local textile print mill.

Tootal Broadhurst Lee Co., Manchester, England, reports net profits for the year, ended on June, of £194,891, against £144,182 the previous year.

PROCESSING IN THIS ISSUE

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TEXTILE WORLD'S

Engineering Digest

ABOUT a year ago, in this department, we recommended industry-wide support of the survey of textile waste treatment and recovery started under the auspices of the Textile Foundation. That study is now completed and a report has been prepared. Though technical in nature, it is written in layman's language. It should be useful to manufacturer, chemist, engineer and student interested in problems of waste disposal. A number of copies are available for complimentary distribution. Those interested should apply to the Textile Foundation, Commerce Building, Washington, D. C.

This is one more job added to the impressive record of research which the Textile Foundation is financing.—*Editor.*

Textile Safety to Be Debated

A new type of program is planned for the annual congress of the Textile Section, National Safety Council, to be held Oct. 7 and 8, at Atlantic City. Instead of the formal presentation of papers, as in previous congresses, round-table discussions will be held on various subjects.

For the Wednesday session the following topics are scheduled for debate:

1. How to prevent or control fires in pickers and other textile machinery.
2. Employee good will as developed by the personnel department and its relation to accident prevention work.
3. What is the value of a safety committee?
4. Do guards slow down production?
5. How can accident-prevention work be developed so that interest is maintained at all times?
6. What effect does an accident have upon the efficiency of your plant?
7. What direct ways do personal injuries affect operating costs?

The Wednesday discussion, open to all present, will be lead by J. W. Lord, Boston Manufacturers Mutual Fire Insurance Co., Boston; B. B. Mangum, Collins & Aikman Co., Roxboro, N. C.; M. W. Heise, Proximity Manufacturing Co., Greensboro, N. C.; F. G. Lippert, Liberty Mutual Insurance Co., Richmond, Va.; A. S. Llewellyn, Kendall Mills, Camden, S. C.; G. C. Shuford, Cliffside Mills, Cliffside, N. C.; and H. H. Willis, Clemson Agricultural College, Clemson College, S. C.

Topics to be discussed on Thursday will be the following:

1. Are safety rallies of all employees worth more than overseers meetings?
2. Should the "big man" attend all monthly meetings of safety committees?
3. Why should safety be considered as an operating function?
4. Benefits of general building and job cleanliness.
5. Does standard first-aid training to employees assist in accident prevention work?
6. Some new ideas in employee education.
7. The importance of selecting the proper employee for the proper job.

The Thursday discussion will be lead by T. A. Wilson, North Carolina Industrial Commission, Raleigh, N. C.; R. McFarlane, Sayles Biltmore Bleacheries, Biltmore, N. C.; N. G. Goode, American Enka Corp., Enka, N. C.; J. T. Trolinger, North American Rayon Corp., Elizabethton, Tenn.; W. H. Nickels, Jr., Virginia Industrial Commission, Richmond, Va.; F. E. Matthews, Blue Ridge Rayon Mills, Alta Vista, Va.; and T. S. Marshall, Virginia Bridge Co., Roanoke, Va.

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Power-Show Plans Progressing

A combination of buying forces is expected to converge at the Twelfth National Exposition of Power & Mechanical Engineering scheduled to be held Nov. 30 to Dec. 5 in the Grand Central Palace, New York. These forces are increasing business, normal replacement of obsolete equipment, and replacement of obsolete equipment accumulated during the depression. Equipment on display will include fuels, combustion equipment, refractories, steam-generating equipment, steam-distribution equipment, piping and fittings, prime movers, pumps and hydraulic equipment, electric generators and motors, electrical transmission, control apparatus, precision instruments, handling equipment, heating equipment, refrigeration, ventilation, air-conditioning, etc.

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D-13 Meeting

The fall meeting of Committee D-13, of the American Society for Testing Materials, will be held in New York, Wednesday, Thursday and Friday, Oct. 14-16. Subcommittee meetings will be held each day; a papers' session on Thursday afternoon, to include a symposium on rayon; a general session of the committee on Thursday and one on Friday; and the banquet Thursday evening.

"Lighting to Fit Job" —Theme of Meeting

New possibilities in factory lighting to fit specific needs were disclosed at a recent meeting of industrial lighting specialists and field representatives of General Electric Vapor Lamp Co., held at Nela Park, Cleveland, Ohio. Particular emphasis was laid on the increased flexibility, both from the visual and economic standpoints, which has come about with the development of the new bulb-type mercury lamps and various color-corrected combinations of mercury and incandescent light sources. Improvements cited in the design and operating characteristics of the Cooper-Hewitt type of mercury-vapor tube were said to have increased its range of usefulness for critical seeing tasks.

A review of plants recently rebuilt or relighted disclosed that the higher levels of illumination required to meet sight-saving standards are now frequently achieved without appreciable increase in energy costs as compared to previous inadequate lighting, due to the fact the light output per watt of the bulb-type mercury lamps is approximately twice that of incandescent lamps of the same wattage.

Where color problems are encountered, as in certain textile operations, new self-contained combination units are being adopted on a wide scale. Color correction is obtained by balancing the bluish effect of the mercury light against light from incandescent lamps, which is rich in red and yellow components.

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Color Tests Made By Federal Bureau

Applications of colorimetry and spectrophotometry in the textile industry are illustrated by a discussion of two specific problems which have been considered in the textile section of the National Bureau of Standards, according to William D. Appel, chief of the textile section.

The first study tends to show how with simple equipment manila rope can be graded with respect to the color of the fiber rather than the appearance of the rope. This is because the range in colors to be graded is limited to a series having but one principal variable, brightness. The method has been adopted by the industry and is used in the Federal specifications for manila rope.

The other problem, the evaluation of color fastness to light, has not to date proved to be entirely feasible by means of the usual colorimetric and spectrophotometric methods, though they have been of some help in studying the problem. It does not appear that these methods give an entirely satisfactory measure of color fastness to light, because fastness is judged not only by the magnitude of the color change but also by the objectionableness of the change, which as yet cannot be evaluated.

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New Equipment of Interest to Engineers

Improved Switches. General Electric Co., Schenectady, N. Y. New developments incorporated in Type SB-1 transfer and control switches include electrically stationary contacts, large escutcheon, water- and oil-tight housing, and removable handles.

Valves for Copper Piping. Jenkins

Bros., 80 White St., New York. New line of Solder-End valves for 150-lb. service on copper lines.

Multi-Breaker Load Center. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and Square D Co., Detroit, Mich. Multi-breaker load center for use as a substitute for the conventional 115 to 230 volt a.-c. entrance and branch circuit protective equipment. The device, hinge mounted in a cabinet, consists of one or more small but effective automatic circuit breakers grouped in a sealed, moulded housing and each capable of interrupting 5,000 amp. at 115 volts a.-c.

Flexible Cable. Anaconda Wire & Cable Co., 25 Broadway, New York. Flexibility and durability featured in the Powerduct cable which is designed particularly for connection of equipment that may have to be relocated. It is said to resist deterioration by oil, grease, and gasoline, and to withstand mechanical abuse.

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Acetylene Assn. to Meet in St. Louis

The 37th annual convention of the International Acetylene Association will be held Nov. 18, 19 and 20 at the Jefferson Hotel in St. Louis, Mo. Technical sessions will be held each afternoon and on two evenings. The oxy-acetylene process of welding and cutting metals will be featured at these sessions, along with other subjects.

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Electro-Depositing Tungsten as Anti-Corrosive

A process by which tungsten can be electro-deposited in a homogeneous combination with one or more metals through the same electrolytic solution has been developed by Tungsten Electrodeposit Corp., Washington, D. C. This is said to be one of the latest technological improvements in protection against corrosion, erosion, and abrasion. Tungsten is a metal with a high melting point, great hardness, and extraordinary tensile strength. In combination with various metals it is extremely resistant to acid, salt, strong alkaline solutions, hot gases and vapors, and other corrosive chemicals. No expensive or complicated equipment is necessary for its application. Standard nickel-plating equipment is adaptable.

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Engineering Trade News

Holo-Krome Screw Corp., Bristol, Conn., is building a new factory at Hartford, Conn., to be ready for occupancy about Oct. 1. The building is of brick, 90x200 ft., with saw-tooth roof construction. The heat-treating department and the boiler and engine room are housed in an adjoined building. Executive offices will be on the second floor. A convenient railroad siding at the rear of the building gives access to a main railroad line from New York to Boston.

Cooper Alloy Foundry Co., Elizabeth, N. J., announces formation of a new division to be known as Stainless Engineering & Machine Works. Officers are Harry A. Cooper, president, and M. J. Robert, vice-president and general manager. A staff equipped with adequate machinery will supply specialized machine work adapted to stainless and heat resisting metals. The management asserts that it now is in a position to design and construct with any alloy, particularly stainless steel.

Air & Refrigeration Corp., New York, has opened a southern branch office in the Johnston Bldg., Charlotte, N. C., in charge of A. W. Bollenbach, formerly of Ingersoll-Rand Co. The office will be equipped to offer the firm's consulting engineering and contracting service on air-conditioning for textile mills and other industrial plants.

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Medart Co., St. Louis, Mo., announces the following changes in personnel: George S. Denithorne will be sales representative in the Philadelphia area with offices at 1224 Commercial Trust Bldg. John M. Titzel will handle the Pittsburg, Pa., area with headquarters at 412 Westinghouse Bldg. James W. Anderson, of Dallas, Tex., has been transferred to Chicago where a district office was recently opened. Walter G. Kessling, of the home office, has been transferred to Dallas. Medart Co. manufactures a complete line of mechanical power transmission equipment, bar- and tube-straightening machinery, polishing and sizing machinery, etc.

Hagan Corp., Pittsburg, Pa., combustion and chemical engineers, announces that it has formed a new firm in St. Louis to represent its boiler-water conditioning and combustion equipment. The concern is known as Patton & Bruce with headquarters at 526 North Vandeventer Ave. Members are Russell Patton and Warren Bruce. Mr. Patton, a graduate of Armour Institute of Technology has had many years' experience in the power-plant field. Mr. Bruce, a graduate of the University of Illinois in chemical engineering and chemistry, is well known in consulting and research work, having developed the use of tripoli in cement and concrete work. A second firm, to be known as Eshelman & Potter, Inc., has been organized in Birmingham, Ala., because of growing sales possibilities in the South for combustion control equipment. Personnel consists of J. W. Eshelman, of Birmingham, and J. T. Potter, of the staff of Hall Laboratories, Inc., Pittsburg, an affiliate of Hagan Corp.

Cochrane Corp., Philadelphia, has appointed Chester H. Jones as sales director of its specialty division. He will devote his attention to economical development of use of steam in the textile and process industries. He has had broad experience in the industrial field and has been associated with McGraw-Hill Publishing Co. as industrial editor and western manager.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has appointed J. M. McKibbin as manager of the newly created Sales Promotion Department.

United States Stoneware Co., 60 East 42nd St., New York, is demonstrating a motion-picture film on Flexlock rubber joints for acid-proof pipe lines at its New York office.

Hercules Powder Co., Wilmington, Del., elected Charles A. Bigelow as a vice-president and a member of the executive committee last month. Mahlon George Milliken, general manager of the Cellulose Products Department, was also elected a director and William Robert Ellis was named general manager to fill the place vacated by Mr. Bigelow.

Pfaltz & Bauer, Inc., Empire State Bldg., New York, has announced the appointment of J. H. W. Kerston as sales promotion manager. Mr. Kerston was formerly European representative of McGraw-Hill Publishing Co.

Republic Steel Corp., has appointed Hoyle Jones as district sales manager with headquarters in Tulsa, Okla. This appointment fills the vacancy caused by the recent death of C. S. Powers, former district manager. William Hogenson has been named special representative of Republic on Toncan Iron enameling stock. His work will be in conjunction with that department under the new Product Development Division.

Worthington Pump & Machinery Corp. announces appointment of Thomas Cruthers as vice-president of the corporation. Mr. Cruthers' connection with Worthington dates from 1907. He will direct sales activities with large steam power stations, the railroads, waterworks, sewage, drainage and irrigation projects. He will also have charge of general traffic department.

Reliance Electric & Engineering Co., Cleveland, Ohio, which manufactures a complete line of electric motors, including many for specialized textile use, has opened a southern office at Greenville, S. C. K. S. Lord, district manager, will be in charge.

Engineering Mill News

Dallas Mfg. Co., Huntsville, Ala., is spending $30,000 repairing and painting all of the homes of the village.

Lanett (Ala.) Bleachery & Dye Works have purchased the machine shop of Lanett (Ala.) Mill. A three-story addition is being constructed to furnish additional warehouse space and permit the plant to increase its steam capacity.

West Point Mfg. Co. is erecting ten new dwellings for operatives at the Fairfax, Ala., plant. They are four-room buildings.

Talcott Bros. Co., Talcottville, Conn., has asked the state Public Utilities Commission for authority to sell its electric power franchise to the Connecticut Light & Power Co., an offer from the latter having been accepted.

Bigelow-Sanford Carpet Co., Thompsonville, Conn., is converting the power plant from a coal-burning to an oil-burning system which will start operations late in September. The company has used 40,000 tons of coal annually and will consume 7,000,000 gals of oil with the new system in operation. Six 30,000-gal. tanks have been installed for oil storage representing a week's supply of fuel. A piping system will make it possible to unload three tank cars, capacity 24,000 gallons at one time. The entire system in being installed in duplicate.

Hudson (Mass.) Worsted Co. has awarded contract to Ernest L. Aldrich Co. for a boiler plant 1 story 33 x 40 ft., and a plant addition 4-stories, 40 x 210 ft. Eastern Bridge & Structural Co., 88 Crescent St., Worcester, has the steel contract. Earl V. Aldrich is the architect and the Abbott Allen Company, West Medford, is engineer for the boiler plant.

Sellers Mfg. Co., Saxapahaw, N. C., has constructed six new homes for the operatives.

Central (S.C.) Mills have completed the laying of a new floor in the weaving department, and making other necessary improvements.

Woodside Cotton Mills, Fountain Inn, S. C., plant, have rebuilt their large smokestack demolished during a wind storm late in July.

American Spinning Co., Greenville, S. C., has begun a $20,000 renovation and repair work program, including the construction of a new toilet tower, general repairs on the main building and various renovations throughout the main building of the mills.

Pacific Mills, Lyman, S. C., plant, have begun the construction of an $80,000 warehouse, with C. M. Guest & Sons of Anderson, S. C., contracting firm.

Whitney (S.C.) Mfg. Co. is selling homes to operatives at a rate of $10 per month at 3% interest. A number of homes have already been sold, the prices ranging from $800 to $1,500. The company will also sell lots to the employes who wish to build their own homes.

Winnsboro (S.C.) Mills have completed 12 apartment houses, for the operatives. There are two apartments to each.

Riverside & Dan River Cotton Mills, Inc., Danville, Va., at the solicitation of the city authorities of Dansville, Aug. 2, entered into an agreement to furnish the city electric power at 8½ mills per kilowatt, which is approximately what it cost Danville to generate power in its municipal owned plant. The agreement is temporary while the city repairs its own power plant.

Hamilton Cotton Co., Ltd., Ont., has plans for extensions and improvements in steam power house, including installation of new boiler unit and auxiliary equipment.

Belding-Corticelli, Ltd., Montreal, Que., have completed the erection of a transformer room. The building is of brick and cement construction.

FREE FOR THE ASKING—

READERS interested in the catalogs and other useful literature reviewed on this page may secure copies by writing to TEXTILE WORLD, 330 West 42d St., New York, N. Y.

Rayon Sizing

Kem Products Co. Summer issue of *Sizing News* containing article, "Effect on Sizing of Variations in 'Yarn Finish.'" Actual case histories of raw rayon warp yarn—acetate, semi-dull viscose, and bright viscose—are discussed in detail as to yarn finish, what it is, why it varies, how to detect, evaluation of finish in terms of sizing results, etc.

Process Cycle Controller

Bristol Co. Bulletin No. 447, describing new addition to line of process cycle controllers featuring adjustable parts for use where variable-speed control is required.

Interfloor Transportation

Allis-Chalmers Mfg. Co. Leaflet devoted to Nordyke service elevator of the continuous moving-step type for use in transporting goods and employees in multi-floored buildings.

Stainless Steels

American Rolling Mill Co. Illustrated folder, "Twelve Stars of the Stainless-steel Firmament," describing twelve types of Armco stainless steels and their applications.

Unit Heater

Modine Mfg. Co. Illustrated bulletin describing Textype unit heater, especially designed for use where lint or other foreign matter is in air. Special condenser construction is said to eliminate clogging and accompanying blowing-out or cleaning.

Finishing Compounds

Onyx Oil & Chemical Co. Illustrated 56-page handy-sized catalog describing complete line of processing and finishing compounds. Products cover bleaching, sizing, scouring, dyeing, finishing, and printing of silk, rayon, cotton, wool, hosiery, mixed fabrics, and ribbons. Also contains article by Dr. H. H. Mosher, research director, on importance of accurate pH control.

Electrical Equipment

General Electric Co. Folder describing how several companies are saving from $400 to $10,800 a year by improving power factor with Pyranol capacitors. Also leaflets devoted to manual motor-starting switches and squirrel-cage induction motor.

Steel Products

Scully Steel Products Co. Annual (1936) stock list and September issue of *Houghton* such as beams, angles, tubes, rails, fittings, boiler accessories, bolts, nuts, etc.

Payroll Methods

Borroughs Adding Machine Co. Descriptive folder showing payroll accounting plans for compiling information required by social security laws. One set of forms illustrates how to write check (or envelope), employee's statement, earnings record, and payroll sheet—all in one operation. Machines ranging from inexpensive desk bookkeeping machine to automatic calculating accounting machine are shown.

Baskets, Hampers, and Trucks

Meese, Inc. Illustrated catalog devoted to Shamrock line of canvas baskets, hampers, and trucks. Contains specifications and photographs of applications in textile mills.

Air Conditioning

Carrier Engineering Corp. Illustrated reprint from *Heating, Piping and Air Conditioning* of address by Willis H. Carrier, chairman of board, Carrier Engineering Corp., presented at the semi-annual meeting of the American Society of Heating & Ventilating Engineers. Mr. Carrier's address, entitled "Progress in Air Conditioning in the Last Quarter-Century."

Machine Limitation

Wonalancet Co., Booklet-editorial discussing machinery limitation as a retarding factor on progress.

Photomicrographic Equipment

Bausch & Lomb Optical Co. Illustrated catalog of cameras, microscopes, and other equipment necessary for photomicrographic work; contains considerable technical information of interest to the laboratory technician. Also mailing piece describing improved KY wide-field binocular microscope.

Monel Metal

International Nickel Co., Inc. No. 1, Volume XIV of *Inco* carrying illustrated article on use of Monel metal in modernization of Bertram Goldberg, Inc., Johnstown, N. Y., a plant engaged in dyeing, weighting and finishing rayons and silks.

Oils and Sizes

E. F. Houghton & Co. August-September issue of *Houghton Line*, containing articles on the sizing of rayon warps, silk soaking formulas, and other subjects of a textile nature.

Rayon Warp Sizing

Charles B. Johnson. July-August issue of *Rayon Warp Sizing Specialist*, containing list of questions against which to check your sizing equipment in order to determine if it is "all that it should be." Affords simple basis for a revaluation of machines.

Looms

Draper Corp. August issue of *Cotton Chats*, devoted to cost of Model-X looms. It is asserted that 500 Model-X looms cost $25,000 less than 600 Model-E looms and yet afford the same production. An analysis of the situation shows that there is a saving on the looms before they leave the factory, there is a saving on reeds, harnesses and other accessories, there is a saving in floor space, there is a saving in installation. on investment, and on many other factors.

Miscellaneous

Recent issues of manufacturers' publications containing items having a textile slant are as follows: *Enduro Era*, July, article on stainless-steel dye tank recently installed at Pilgrim Piece Dye Works; *Atwood Twists*, July, article on a number of technical manufacturing questions now being asked throughout the throwing industry; *Nickel-Cast Iron News*, July, article on use of alloy iron in textile machinery; *Service Factor*, third edition, picture of installation of Atwood high-speed twisters in mill of Duffy Silk Co., Buffalo, N. Y., lubricated with Sinclair oils.

Pumps, Compressors, Engines

Worthington Pump & Machinery Corp. Bulletins on the following: Vertical four-cycle Type AG gas engine, Type VG horizontal duplix steam pump and receiver sets, Types V3 and V6-A2 air-cooled vertical two-stage compressors, Types DE, DF and DG Monobloc centrifugal pumps for heads to 250 ft., Type VV single and two-stage vertical vacuum pumps, Type CF pressed-steel frame mounted centrifugal pumps, single-stage and two-stage dry vacuum pumps, centrifugal boiler-feed pumps, stationary feedwater heaters, vertical four-cycle diesel engines; horizontal duplex direct-acting fire pumps, vertical-angle three-and six-cylinder air-cooled compressors, horizontal duplex turret-type piston pumps, Monobloc centrifugal pumps, centrifugal acid pumps, simplex air- and steam-heating vacuum pumps, and others.

Long-Draft Roving

Whitin Machine Works. July issue of *Whitin Review*. Contains articles on long-draft roving, spindle bolsters, builder motions for spinning frames and twisters, and high-speed dressing of woolens and worsteds.

Fulling and Drying

James Hunter Machine Co. August issue of the *Counselor*. Contains articles on quadruple-roll fulling mill and on making "fabrics of distinction."

Paints

Pittsburg Plate Glass Co. Color card sent out by Skelly Distributors, Inc., describing advantages of Wallhide, Florhide, Waterspar, etc., lines of paints, varnishes, and enamels.

Boiler Tubes

Babcock & Wilcox Tube Co. Booklet, "Seven Facts About Boiler Tubes," illustrating and describing the various processes of manufacture which are asserted to make the company's products superior. Contains specifications.

Ring Travelers

Victor Ring Traveler Co. July issue of the *Traveler*, containing interesting sidelights on the textile history of New England.

Vat Dyes

General Dyestuff Corp. Color card, "Indanthren Dyestuffs on Mercerized Cotton Yarn." Shows each dye in three depths of shade and gives a number of compound shades; also contains notes of fastness properties, methods of application, etc.

Transparent Packaging

Celluloid Corp. Illustrated 16-page leaflet describing new Protectoid rigid transparent containers, transparent wrapping, window containers, and other transparent wrapping and containers. Contains charts comparing strength of Protectoid with other transparent packaging materials.